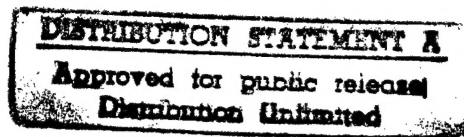


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24 January 1983



# USSR Report

ENERGY

No. 133

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24 January 1983

## USSR REPORT

## ENERGY

No. 133

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## COAL

### VOSTOKMASHZAVOD PLANT DELIVERS MINING MACHINES AHEAD OF SCHEDULE

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 26 Sep 82 p 1

[Article by P. Shchuplov: "Self-Propelled Machines on the Conveyor"]

[Text] The fitter-assembler brigade of the experimental shop at the "Vostok-mashzavod" plant, headed by Communist A. Khromtsov, has pledged to complete the five-year plan in 4 years and to provide the miners with fully operable self-propelled machines. How do they intend to satisfy this pledge?

"By getting ahead of schedule," replied Anatoliy Dmitriyevich, pointing to a rail flatcar with two wheeled drilling machines. "In 8 months we sent 11 double-drill units, four "Ulba" automatic chargers, a universal mine bulldozer and several charging ladles to the country's ferrous metallurgy enterprises."

The brigade leader took special pride in describing two electrohydraulic machines distinguished from others by high drilling speed and low noise and by semiautomatic control. One such self-propelled machine is now working at the Zyryanovsk mine, drilling out several faces per shift. Mine chief Yu. Men'shikov has now asked the machine builders to send another pair of such machine units.

Manufacturing a trailer frame and suspending equipment from it is nothing new to the assemblers. But insulation of hydraulic and electric systems with a dense tangle of conductors and pipes takes up a great deal of time. The assemblers check each operation and each of their steps against the drawings and calculations, correcting even the slightest inaccuracies. All 16 members of the brigade have now learned to assemble complex underground machine units expertly, and they are sending powerful equipment to the miners, as foreseen by the Basic Directions of the country's economic and social development in the 11th Five-Year Plan.

Assembly and testing of the performance of hydropneumatic drilling machines, automatic chargers and high-power bulldozers proceeded simultaneously. Tunnelers and miners are especially fond of the self-propelled chargers, which have replaced the labor of hundreds of demolition specialists, and which are distinguished by high maneuverability and reliability. I was able to see the bulldozers manufactured by A. Khromtsov's friendly collective at work in a mine. Armed with exchangeable blades and buckets, they quickly clean out a face, load the loose rock into rail cars and move ore to overflow drifts.

The brigade leader speaks with great respect about the members of his "team." Before, it consisted of assemblers, drill operators, gas welders, arc welders and even a slinger. If one person got sick, the production schedule was immediately disturbed. Now all assemblers have mastered associated occupations, and they are working on the basis of a single order. The highest scores have been earned by the contributions made by fitter-assemblers Gennadiy Marimov, Vladimir Kizilov, Gennadiy Tarasov, Petr Shevtsov and Valeriy Pesnyakov.

V. Pesnyakov was a miner at the Irtyshsk mine. He came to the plant to acquaint himself with new mining equipment and subsequently decided to build such machines himself. The other brigade members also came here because they wanted to. Having mastered associated occupations, they now constantly surpass the planned quotas and produce machines of excellent quality. In a year and a half the assemblers completed a two-year plan, and they are now working on the quota for April of the third year of the five-year plan.

In March Aleksandr Khromtsov entertained some dear guests--participants of the all-union competition of machine building brigade leaders of nonferrous metallurgy. Colleagues from Sverdlovsk, Novosibirsk, Kazan, Olenegorsk and other cities of the country studied the experience of the Ust-Kamenogorsk machine builders and generously shared their own. Before departing together with members of A. Khromtsov's brigade they served a watch of friendship and came up with a record output.

"We will introduce the single order too," said T. Yunusov, a guest from Kazan, as he departed. "We will use the point system for determining wages, and then we will challenge you to a competition."

Now the assemblers of the experimental shop at the "Vostokmashzavod" plant are preparing self-propelled drilling machines for the miners. They have pledged to send not less than 30 machines to mines in the Kazakh SSR, Siberia and the Far East by the 60th anniversary of the USSR's formation. These machines will replace the labor of thousands of miners and increase mine output.

11004

CSO: 1822/64

## COAL

### KARAKAN OPEN PIT IS OPERATIONAL

Moscow TRUD in Russian 24 Aug 82 p 1

[Article by Yu. Kotlyarov: "Karakan Coal is Moving"]

[Text] Assembly of a high-power walking excavator with a bucket capacity of 20 cubic meters has begun in the assembly area of the Karakan open-pit coal mine, presently under construction.

I am standing on a hill covered by yellowing grass. To the east stretch the ridges of the Kuznetsk Alatau. Below, in the valley where the River Inya and its tributaries wind their way, the town of Karakan lies. By the Siberian yardstick it is ancient: It is at least 150 years old. Back in 1859 it consisted of 48 homes and 296 inhabitants. It is here on the town's outskirts that mechanics are beginning to assemble the walking giant. It took more than a dozen rail cars to deliver the hundreds of tons of structures making up the excavator to the nearest rail station. From there, the parts were driven to the open pit by expert drivers.

By the end of year the excavator will rise up on its powerful "legs" and walk this way, to the steep cliff directly before us--the first stoep of the future open pit. Two excavators with buckets of a 10 cubic meter capacity are now skimming alluvial rock from the coal bed, which does not lie very deep: just 25-30 meters. But yet it is 10 meters thick, and the quality of the coal is enviable.

Kuznetsk coal, the explored reserves of which number in the hundreds of billions of tons, is distinguished by more than just high quality. Its extraction costs much less than in the Donets Basin for example. Especially high hopes are now being laid on the most profitable coal mining method--the open-pit method. A third of all of the basin's coal is now being mined by the open-pit method, and in the next few years the output of the open pits will increase by about another 8 million tons. This will happen primarily due to assimilation of new regions such as Karakan, Yerunakovskiy and Bachatskiy.

In the local language Karakan means "black blood." The name is not accidental: In some places the coal beds come right up to the surface, and the water in rivers crossing these places is black. And there is much coal here. Fifty beds

have been explored, of which 16 can be worked by the open-pit method. There are plans for creating three open pits and a mine. Total extraction will reach 120 million tons of fuel per year. For comparison, consider that the entire Kuznetsk Basin now produces about 150 million tons.

The "Karakanskiy 1-2" open pit is to become the first-born. At first it will supply the national economy with 6 million tons of coal per year, and when it reaches its full output, it will produce 10 million tons. According to the plans its first generation is to be built in 1986-1989. But the country needs the coal right now! And specialists of the "Kemerovougol'" Production Association have worked out what we might call a counterplan for assimilation of Karakan. Incidentally, they also drew up such a plan for the Yerunakovskiy deposit. They decided to open the way to the coal by their efforts, to lay an approach road, install a temporary electric power transmission line and place the first excavators into operation.

Their plan was approved. A new open-pit construction administration was created, the equipment was brought in, and by as early as last winter the first 170,000 tons of fuel were produced. Preparations have now been made for mining twice that. For the moment the coal is being delivered to the rail car loading point by trucks. Meanwhile the builders are extending an access railroad to the open pit: It will reach the production area by next year. Erection of two permanent substations is nearing completion: By the end of the year the pioneers will be enjoying dependable electric power supply.

The initiative and resourcefulness of the miners, who were not afraid to lay additional burdens upon their shoulders, reduced the pit construction time by several years.

11004

CSO: 1822/64

## COAL

### NINE-MONTH COAL MINE PRODUCTIVITY SUMMARIZED

Moscow EKONOMICHESKAYA GAZETA in Russian No 11, Oct 82 p 3

[Article by I. Nikolayev: "The Labor Successes of the Miners: Coal Industry in 9 Months"]

[Text] In 9 months of this year the mines and open pits of the USSR Ministry of Coal Industry surpassed the plan by 5.2 million tons of coal and 336,000 tons of shale. In comparison with the corresponding period of last year coal extraction volume increased by almost 11 million tons, to include by 1.6 million tons in the Donets Basin, by 2 million tons in the Kuznetsk Basin and by 730,000 tons in the Karaganda Basin.

At the threshold of a great national holiday--the 5th anniversary of the adoption of the new USSR Constitution, significant successes have been achieved in the competition by the following collectives: the "Donetskugol'" (general director, A. Fusin), "Krasnoarmeyskugol'" (P. Bigma) and "Shakhterskantratsit" (V. Martovitskiy) production associations in the Donets Basin; the "Yuzhkuzbassugol'" (V. Yallevskiy) and "Severokuzbassugol'" (Yu. Milekhin) production associations in the Kuznetsk Basin; the "Vorkutaugol'" Production Association (A. Belikov) in the Arctic.

High-productivity brigades are making a significant contribution to development of coal industry. The brigade headed by Hero of Socialist Labor M. Reshetnikov of Kemerov Oblast was the first in the sector to complete its plans ahead of schedule--to mine not less than 1 million tons of coal this year. The brigade led by Hero of Socialist Labor K. Markelov of Rostov Oblast is also moving confidently toward this same goal.

The sponsorship movement is acquiring more and more followers in coal industry. One hundred ninety of the best brigades, which extract a thousand or more tons of coal per day from a single working face, have assumed collective sponsorship over the same number of brigades working with a lower productivity, and 57 of them have already been raised to the 1,000-ton limit.

Extraction by the most economical open-pit method is developing at an accelerated rate; about 30 percent of all coal is now mined by this method. As a rule the best results are achieved at the open pits by collectives which regularly increase the volume of stripping operations and prepare ahead of time for coal

extraction. These open pits include "Nazarovskiy" in Krasnoyarsk Kray, "Azeyskiy" in Irkutsk Oblast, imeni 50-letiya Oktyabrya in Kemerovo Oblast and a number of others.

An increase in pay rates and salaries and improvement of the wages of miners in the Donets, Kuznetsk, Karaganda, Pechora and Ekibastuz basins during the first quarter of this year in compliance with a party and government decision promoted improvement in the work of many of the sector's enterprises and organizations. Active preparations are now being made for implementing this social measure in the rest of the country's coal regions in the first quarter of 1983.

Despite certain successes, serious shortcomings persist in the work of coal industry. A number of production associations and combines and some enterprises are unable to meet the plan. In most cases the causes are delays in work preparations, ineffective use of available mining equipment and a low level of labor and production organization. Mining operations are not developing adequately in the "Kemerovougol'," "Krasnodonugol'," "Pervomayskugol'," "Leninskugol'," "Prokop'yevskugol'" and some other production associations.

11004

CSO: 1822/64



## COAL

### BRIEFS

COAL REPLACES WOOD--Shelekhov, Irkutsk Oblast--Coal from the south of the Yakutsk ASSR will save a significant quantity of wood. This was demonstrated by experimental industrial tests completed at the Irkutsk Aluminum Plant which, until now, has been using wood chips as one of the components for obtaining metallic silicon. As with coal, wood chips contain carbon used as a reducing agent in the electrothermal process. But there is five times more carbon in coal. That means that wood consumption can be reduced by the same amount. And wood chips can be used much more advantageously in the production of cellulose, nutrient yeast and other products. [by V. Khodiy] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Oct 82 p 2] 11004

'KIZELUGOL' ASSOCIATION--Perm Oblast--Miners of the "Kizelugol" Association extracted 100,000 tons of hard-to-get Ural coal in excess of the plan since the beginning of the year. This means that it satisfied its pledge in honor of the 60th anniversary of the USSR's formation ahead of schedule. Collectives of the mines imeni Krupskaya, "Shirokovskaya," "Gremyachinskaya" and "Skal'naya" made a substantial contribution to the labor victory. The success of "Kizelugol" miners is no accident. They are working rhythmically, without interruptions. The working faces are prepared beforehand, sensible use is made of the equipment, and production discipline has risen. [by V. Ukolov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Oct 82 p 2] 11004

'VORKUTAUGOL' ASSOCIATION--Vorkuta--Beating the schedule, miners of the "Vorkutaugol" Association mined 140,000 tons of fuel in excess of the plan since the beginning of the year. This is much more than had been foreseen by the pledges. This success was achieved owing to confident use of mining equipment, and due to the widespread competition in honor of the 60th anniversary of the USSR's formation. The greatest contribution to the achievement of arctic coal miners was made by miners of the "Ayach-Yaga" and "Yuzhnaya" mines. [by V. Krukovskiy] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Aug 82 p 1] 11004

NEW OPEN PIT--A high-output open coal pit has been placed into operation at the Pavlovskiy lignite deposit. This is the fifth open pit of the "Primorsku-gol" Association. [Text] [Moscow PRAVDA in Russian 25 Oct 82 p 2] 11004

NEW ANTHRACITE LONGWALL--Rovenki, Voroshilovgrad Oblast--Switching to a new longwall did not have an effect on the work indicators of the brigade led by



Hero of Socialist Labor G. Motsak at the Mine imeni Kosmonavtov. As of yesterday it extracted half a million tons of anthracite since the beginning of the year. A fourth of this quantity is in excess of the plan. Many innovations that helped to hasten the mining rate were born in the mining brigade, which has been led by G. Motsak for 16 years. It was here that an effective production process which has now achieved broad acceptance took its first steps. In this process, the operations of mining the fuel and preparing a longwall are combined. Here also many small mechanized resources were used successfully for the first time as well. The proficiency and innovative inquiry of the miners are helping them to complete each year with a substantial surplus over the production norm. G. Motsak's brigade has brought out a grand total of more than a million tons of anthracite in excess of the plan. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Oct 82 p 1] 11004

ROTARY EXCAVATOR DELIVERED--Angren, Tashkent Oblast--The first rotary excavator went into operation at Central Asia's largest "Angrenskiy" open coal pit. In an hour of work it handles about 1,000 tons of fuel. Another six such giants will be manufactured by the collective of the Donetsk Machine Building Plant imeni Leninskiy Komsomol Ukrainy in fulfillment of an order from Uzbek miners. Reequipping of the open pit will make it possible to increase fuel extraction in the present five-year plan. [Text] [Moscow TRUD in Russian 24 Sept 82 p 1] 11004

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## FUELS

### METHOD OF DETERMINING ECONOMY'S PETROLEUM MACHINEBUILDING NEEDS TOLD

Moscow PLANOVVOYE KHOZYAYSTVO in Russian No 10, Oct 82 pp 53-62

[Article by Yu. Andrianov, chief of a USSR Gosplan section, and F. Abubakirov, chief of a USSR Gosplan subsection: "Problems of Planning Petroleum Machinebuilding During the 11th Five-Year Plan"]

[Text] The Main Directions for Economic and Social Development of the USSR During 1981-1985 and During the Period up to 1990, which was adopted by the 26th CPSU Congress, specified, "...provide in 1985 for the recovery of crude oil (and gas condensate) in the amount of 620-645 million tons.

"Develop the oil-recovery industry in West Siberian regions, the Kazakh SSR and the northern part of the European portion of the country at a faster pace, and introduce oilfields into industrial development more rapidly, based upon the wide use of industrialized methods of construction and the use of outfitted-module equipment that has a high degree of factory preparation.

"Expand the use of new methods for stimulating petroleum formations and thereby increase the withdrawal of petroleum from the ground. Introduce the progressive gaslift method for operating wells and highly productive submersible electric pumps...."

It is planned to develop intensively the largest regional production complex in West Siberia. Oil (and gas-condensate) recovery there should reach 385-395 million tons in 1985.

In the oil-refining industry, a rise in the utilization effectiveness of crude, an increase in the severity of its refining, and a reduction of losses of crude and of petroleum product are called for.

The congress set large-scale tasks for the gas industry: "...Consider execution of the program for boosting gas-recovery development as a most important task.. Bring its volume up to 600-640 billion m<sup>3</sup> in 1985. Pave the way for further accelerated development of the industry.

"Introduce highly productive automated modular gas-treatment installations at gas fields.

<sup>1</sup>"Materialy XXVI s"yezda KPSS" [Papers of the 26th CPSU Congress]. Moscow, Politizdat, 1981, page 149.

"Increase capacity for the integrated refining of crude oil and natural gas....Erect high-capacity gas pipelines with a high degree of automation and operating reliability."<sup>2</sup>

Solution of the tasks that the 26th CPSU Congress set for the indicated branches of industry is directly connected with petroleum machinebuilding, since the degree to which these branches are supplied with highly productive equipment will be a determining factor in reaching the contemplated goals.

Analysis of the development of the oil, gas and oil-and-gas refining industries during the Eighth, Ninth and 10th Five-Year Plans enabled trends to be found that effected substantial change in the structure of production and of fixed industrial-production capital, both in the indicated branches and in the production structure of petroleum machinebuilding output.

Major changes are occurring in the deployment of the oil and gas recovery industry with growth in the volume of oil and gas recovery in the country's northern and eastern regions, for which difficult natural and climatic conditions and remoteness from the oil and gas industries' main bases are characteristic. Operation of the fields in the indicated regions requires an increase in capital investment and the creation of unique equipment intended for use at low temperatures.

Work is being expanded to increase the degree of removal of crude from the ground by using new methods for stimulating the formation, with a view to stabilizing and later increasing the recovery factor during the 11th Five-Year Plan. These require the creation of specialized capacity for producing equipment not previously manufactured in the USSR.

Because of the natural reduction in well productivity, oil-recovery enterprises must, in order to maintain the achieved level of recovery of crude, constantly build up fixed industrial-production capital by drilling new wells, erecting facilities for gathering, preparing and transporting oil and gas and facilities for formation-pressure maintenance, and so on. This is caused by peculiarities in the operation of oil and gas fields, which, at the start of their development, are marked by high well productivity and insignificant amounts of fixed capital, but in ensuing periods by an increase in capital, which is necessary for maintaining for maintaining oil and gas recovery at the initial level.

The effect of negative factors is being intensified: water encroachment of the recovered product and the number of wells at fields with higher oil temperature and viscosity are growing, poorly productive deposits are being drawn into development, and the corrosive activity of the wells' product is increasing. Capacity for treating oil at the oilfields in order to turn over to customers oil of better quality must be expanded. This, in turn, will greatly increase the cost of building up the oilfields.

The share of wells with mechanized recovery of crude is increasing. During the 11th Five-Year Plan it will be about 89 percent. The intensive development of mechanized methods for recovering crude poses serious problems in the servicing and repair of well equipment, since the amount of repair work at the wells is already great now. And with an increase in the producing-well inventory, the amount of repair work will grow still more.

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<sup>2</sup>Ibid, page 150.

It has now become necessary to create outfitted-module units with a capacity per module of up to 5 billion m<sup>3</sup> per year (a type of large plant for treating gas) and to equip the gas fields with them in order to treat the gas--to dry and scrub it until it reaches the state that will avoid hydrate formation (plugging) and pollution of gas pipelines, and to erect special booster compressor stations for fields that have entered the late stage of development and fields with low formation pressure that have been brought into operation. An increase in the amount of recovery of sulfurous and highly sulfurous oil and gas also requires the creation of special equipment for scrubbing them of sulfur.

As a result of the negative effects of the indicated factors, the capital intensiveness per unit of recovered crude rises, a substantial portion of the capital consisting of oilfield equipment.

Similar changes are also occurring in the nature of drilling. In addition to the common negative factors associated with the transfer of the main volume of operational and deep-exploration drilling to areas of West Siberia, the country's North and West Kazakhstan, the influence of such a factor as increase in the average depth of operating wells is being intensified.

The major tasks that the 26th CPSU Congress set for oilfield, gas-field and oil-refinery workers and the peculiarities and trends in developing these branches of industry during the 11th Five-Year Plan and in the longer term that are objectively taking shape have defined new problems also for petroleum machinebuilding during the 11th Five-Year Plan.

The continuous provisioning of the oil and gas industries with equipment and an acceleration in the creation of flexible capacity for producing this equipment becomes the main task of petroleum machinebuilding during the 11th Five-Year Plan and over the long term. Here we have in mind satisfaction of the optimal requirements for equipment that will provide for expanded reproduction in the oil, gas and petroleum-refining industries and also for forming the necessary capacity for petroleum machinebuilding at minimum cost.

The factors named above that increase capital intensiveness of the raw material being recovered and refined or of well penetration dictate such a burgeoning growth in the requirements for equipment that petroleum machinebuilding cannot catch up with its pace in developing its productivity capacity and in mastering it. The problem can be solved only by the accelerated introduction into production work of scientific and technical achievements in the area of creating operating equipment that is more productive, wear-resistant and reliable in operation, which changes the technology of drilling wells and recovering oil and gas, substantially increasing labor productivity at the fields and reducing the specific requirement for equipment per unit of useful benefit from drilling for and recovering the raw material or from refining it. Consequently, drilling and oilfield-operations equipment should, in its engineering level, meet not only the rising requirements of modern technology for drilling wells and for recovering and refining oil and gas and be in accord with the achievements of science and technology in the area of this technology, but it should also itself actively influence improvement in the operating processes. The interdependence of production technology in the raw-materials industries and of petroleum-machinebuilding technology manifests itself here.

In realizing the five-year plan and in working out annual plans for developing petroleum machinebuilding, maximum and effective use of the design-development backlog and of the scientific and technical developments that exist in the branch, and the specialization and reequipping of petroleum-machinebuilding enterprises for the accelerated introduction of scientific and technical achievements into production become tasks of paramount importance.

The measures called for in the five-year plan for 1981-1985 and some additional decisions have enabled the national economy's requirements for petroleum-field equipment and geological-exploration drilling equipment to be balanced with the production thereof at domestic machinebuilding enterprises, taking the state of their development into account. The effectiveness of these measures is expressed in equipment savings by a reduction in the specific requirement thereof per unit of useful benefit for the customer.

Such a capital-saving (from the customer's standpoint) form of developing machinebuilding, which is based upon an accelerated introduction of scientific and technical achievements, apparently meets the prerequisites for a mature socialism more completely when a decisive turn toward intensive development of the economy has been made.

A rise in the wear resistance of drilling tools, an increase in time between repairs and in the operating reliability of drilling and petroleum-recovery equipment, and the creation and production of drill rigs and equipment complexes with a broad range of technical and economic parameters for developing and supporting the wells that have been drilled, which provide for greater effective utilization of this equipment in various parts of the country, considering the climatic and geological peculiarities that are inherent to them, are most important directions in the indicated work in petroleum machinebuilding.

Let us cite some examples. The main rock-breaking tool for deep operational and geological-exploration drilling is the roller bit. Well penetration per bit now averages 55-57 meters. Consequently, every 50-60 meters of penetration the worn tool must be replaced by making nonproductive round trips from depths of several kilometers. The large scale of losses caused by inadequate bit durability can be judged by the fact that more than 10 percent of all calendar time for well drilling is spent on round-trip operations.

A number of measures are being taken to raise the durability of roller bits. Roller drill bits with oil-filled sealed mounting, and also with hard-alloy outfitting, that increase penetration per bit to 100-105 meters have been designed and produced. The Ministry of Chemical and Petroleum Machinebuilding has in a short time built and put specialized capacity for producing high-quality bits into operation.

A rise in bit durability will permit the same number of drill rigs, rock-breaking tools and other types of drilling equipment to support a substantial increase in drilling volume with the same number of drilling brigades and drilling organizations.

The set of measures for increasing drill-bit durability that was called for by the five-year plan and by supplementary decisions will enable the requirement for bits and the production thereof to be balanced by the insignificance of the amounts of the production and of the metal consumed, while drilling volume will increase more than 1.5-fold.

Substantial structural changes connected with the introduction of scientific and technical achievements are called for in the production of drill rigs for developmental and deep exploratory drilling. During the 10th Five-Year Plan the creation of rigs for drilling cluster wells was provided for. This enabled a cluster of 10-12 directional wells, which were dispersed in fanlike fashion, to be drilled under the difficult West Siberian conditions without reassembling the rigs. The five-year plan and the annual plans for 1981-1985 gave priority to cluster drill rigs by allocating to them material resources for their manufacture and called for a high pace of growth in their production. Experience in the use of rigs for cluster drilling indicates that well penetration per one assigned rig is increased about 1.4-fold to 1.5-fold in comparison with ordinary rigs. New drill rigs of general-purpose assembly capability, with special transport means, which allow a reduction in time spent building oil and gas wells, are being introduced.

The changing conditions for recovering oil and gas face the machinebuilders with new tasks. The time has now come when serial production of rigs for drilling wells up to 6,500 meters deep must be mastered because of the increase in such operations.

No less important is the problem of organizing the serial production of drill rigs with maximum automation of the technological processes of drilling, especially in remote regions with unfavorable climatic conditions (West Siberia and Kazakhstan), for which the recruitment of workers for drilling brigades is difficult. An experimental automated drill rig created by Leningrad scientists and engineers has shown great effectiveness.

Measures for reequipping drilling operations are comprehensive in nature and are not restricted to introduction of the forms of basic drilling equipment enumerated, for they embrace the whole complex of equipment that is designed for drilling: bottom-well motors, various types of equipment for preparing and cleaning drilling fluids, blowout preventers, and so on. Such changes in the technical parameters of the equipment as result from the introduction of scientific and technical achievements should be considered in the calculations.

Trends in changes in the designs and quality of equipment for recovering oil and gas, that is, for operating the wells, are similar in nature. Developments are already completed or close to completion that provide for increased service life, productivity, time between repairs, resistance to cold and other qualitative indicators for the pumps that pump crude from the wells, Christmas trees, pumping jacks, units for well repair and completion, pumping and cementing units, and so on. We cite as an example submersible pumps for pumping crude and rods for the deep pumping method of recovering crude.

More than 30 percent of the country's mechanized oil recovery is provided by submersible centrifugal UETsN's [electric centrifugal pumping units]. Until recently average operating time between repairs for wells equipped with them was much shorter than for wells equipped with the various units sold by foreign companies. A rise in the reserve for reliable operation of submersible pump units is one of the important problems of domestic petroleum machinebuilding. Its solution is linked with the participation of many branches--ferrous metallurgy, the chemical, electrical-equipment and petrochemical industries and other branches. Implementation by the ministries of the indicated branches and by the prime ministry--Minkhim-mash [Ministry of Chemical and Petroleum Machine Building]--of the solutions and



measures adopted on this questions that are called for in the five-year plan will enable achievement of the parameters planned for pumping units.

As for rods for the deep-pumping rod method of recovering crude, surface hardening with high-frequency currents increases their strength. Experience in the use of such rods has indicated that, by reducing the number of their breaks, conditions for well operation are improved and the requirement for rods for normal operation is reduced by about 25 percent, and repair manpower also is reduced. Minkhimash is now reequipping enterprises engaged in rod production, in order that they may convert, beginning in 1983, to the priority manufacture of rods treated by the new methods.

In the field of oil refining, work is being done to increase the utilization effectiveness of capacity, to intensify capacity later by replacing low-powered worn operating units with units of greater capacity and by introducing integrated installations that add severity to oil refining, with greater unit capacity per module of the complex.

Substantial structural changes are occurring in the production of equipment for recovering and transporting gas. Ball cocks with pneumatic-hydraulic drive and control assemblies based upon a pressure of 100 kg-force/cm<sup>2</sup> for trunk gas pipelines with a nominal bore diameter of up to 1,400 mm; apparatus for air cooling of natural gas, based upon a working pressure of 75 to 100 kg-force/cm<sup>2</sup>; gas-transfer pumping units based upon a pressure of 100 kg-force/cm<sup>2</sup>, for transporting natural gas along trunk gas pipelines, with a drive capacity of 16,000 kW; and other items have been developed and are being created. The achievements of domestic engineering in this area will enable gas lines that operate on increased gas pressure (up to 100-120 atmospheres) to be built. Conversion to the construction of gas lines with a pressure of 100 atmospheres will enable the productivity of one strand of a gas pipeline to be increased by 35 percent.

Additional measures that are called for by the five-year plan and have been developed will not only permit the solution of technical and economic problems but will also completely neutralize the discriminatory measures undertaken by the USA administration against the USSR in regard to construction of the Siberia-West Europe gas pipeline, particularly the delivery of equipment from Western countries.

The uniqueness and complexity of planning petroleum machinebuilding consists primarily in the necessity for a precise determination of the results of the interaction of various factors of change in equipment requirements that complement each other or are mutually exclusive on the development of this branch. While the "external" factors, for example, change in regions of recovery and in geological conditions, operate negatively, economically speaking, increasing the equipment requirements for the oil, gas and petroleum-refining industries, then the introduction of scientific and technical achievements, a rise in the quality of the equipment, and improvement of the organization of production and of work during well drilling and during oil and gas recovery will reduce it.

The national economy's requirement for the output of petroleum machinebuilding is the initial driving force for planning the pace of development of petroleum equipment production and for creating by the required time the production capacity necessary for satisfying this requirement in full volume and variety.

The prerequisite of full satisfaction of the requirements can be met only if the production-capacity structure in petroleum machinebuilding corresponds adequately to the requirements of the oil, gas and petroleum-refining industries. In this case, the pace of development of petroleum machinebuilding should anticipate the development pace of the industries that require the products it produces. Only in this way will the way be paved for speeding up the introduction of scientific and technical developments in these most important branches of the national economy and for increasing the effectiveness of their operation.

With a view to determining the development dynamics of petroleum machinebuilding, the requirements of the oil, gas and oil-and-gas refining industries for petroleum equipment were determined in terms of cost, based upon preliminary calculations made by scientific-research institutes and design-development bureaus of Minkhim-mash, Mintyazhmash [Ministry of Heavy and Transport Machine Building], Minnefteprom, USSR Mingeo [Ministry of Geology], Mingazprom and other ministries, taking into account the forecast of changes in the structure of certain basic types of output.

Thus, the data of scientific-research institutes of the country and of other developed countries of the world indicate that, in the area of drilling oil and gas wells, the classical method of breaking rock by the rotary method is, basically, being retained but that later it will be developed to take the route of increasing the pressure during drilling and using sturdy all-regime bottom-hole motors, high-quality bits made of pure steel and equipped with hard alloys, automated drill rigs, and so on; in the area of recovering oil and gas, work will increase substantially to improve methods for effective stimulation of the formation with a view to obtaining maximum production from it; and, in the area of producing petroleum product, a stable trend toward intensifying and accelerating the technological processes of refining oil, using highly effective catalysts that can execute refining processes at low temperatures, and so on, is planned.

The requirements for petroleum equipment have been determined separately for petroleum-field equipment, geological-exploration drilling equipment (and spare parts therefor) and gas-treatment equipment.

Standard practices and instructions of a number of institutes call for two basic approaches to determining the standards of the requirements: special-purpose systems and standing systems, the necessity for their complementary use having been substantiated.

The first consists in the development of standards whose dynamics should consider the effect of progressive shifts and the basic directions of scientific and technical progress. The second (standing) is called upon to supplement and monitor and validate the standards produced by the specific-purpose approach.

The term "standing" points to a basic property of an economic system that is used in forecasts of this kind--continuity and persistence of all economic processes and their smoothness.

This method of computation, which is used as a monitoring method for oilfield and geological-exploration equipment, indicates that it can be used, obviously, only in short-term planning, since, with the dynamic development of our economy during the five-year plan, in some branches of the national economy and the industry changes occur in the conditions and nature of production, and also in the equipment, that



are not smooth but drastic. With the high rate of growth in equipment requirements that are associated with changes in the conditions for recovering oil and gas, the data about it that are computed by the standing method should be compared and revised with the results of factor calculations. How necessary this is, is evident from the examples of the calculations cited below.

In order to calculate the equipment-requirements standards by the factor method, the following function is used:

$$H_n = H_0 \cdot \phi_1 \cdot \phi_2 \cdot \phi_3 \dots \phi_n,$$

where  $H_n$  is the long-term standard for the requirement;

$H_0$  is the base standard for the requirement; and

$\phi_1, \phi_2, \phi_3 \dots \phi_n$  are the coefficients that consider the effect of the main factors on the change in the base standard.

For example, in determining standard indicators of the requirements for a subgroup of equipment for drilling developmental wells and deep-exploration holes for oil and gas, the following compilation of basic factors that influence the standard for requirements was prepared as a result of an analysis of trends in development of the oil and gas industries for the near term: an increase in the amounts of drilling in regions with complicated conditions and offshore, change in natural and geological conditions for drilling, growth in average well depth, and a rise in the technical level of equipment and the intensiveness of its use.

In computing the coefficient of the effect of an increase in drilling volume in regions with complicated conditions (factor  $\phi_1$ ), the rate of growth of this volume and the increased cost of the drilling equipment for work under complicated conditions (at temperatures of -45 and -60 degrees C), which is manufactured from steel of higher-quality and more expensive grades, were considered. The difference in cost of the materials for the various conditions for operating the equipment is about 25 percent. Moreover, the drilling equipment should have reliable shelter for the brigades that work on it, and, in the long term, even a structure for maintaining a comfortable microclimate and a special heater for certain types of equipment. These additional requirements, which are connected with complication of design, cause costs to increase by 15 percent.

The value of the coefficient  $\phi_1$ , which is 1.09, was determined in accordance with the formula:

$$\phi_1 = 1 + \frac{5}{100} (n_{M \frac{M}{100}} + n_k),$$

where  $5$  is the increase in drilling in regions with complicated conditions, in relation to total drilling in the country, in percent;

$M$  is the share of the cost of materials and of outfitting items in the cost of the equipment, in percent; and

$n_M$  and  $n_k$  are the indices of increased cost of the equipment because of increase in the cost of the basic materials and because of design complexity.

The value of the coefficient  $\phi_2$ , which reflects the effect of change in natural and geological conditions for drilling in the country, was determined as a ratio of the

total share of operating expenditures on the maintenance of equipment and tools per meter of well penetration in the plan period to the expenditures for the base period. The multiple increase in drilling volume in West Siberia and the Komi ASSR, where there are high levels of operating expenditures for maintaining the drilling equipment, and the simultaneous decrease in drilling in regions with low expenditure levels influenced considerably the coefficient of increased cost of the equipment, which was 1.2.

The coefficient of increase in average well depth ( $\phi_3$ ) reflects additional expenditures for drilling equipment because of reduction in the net effective speed of drilling as depth increases. For example, while at depths of up to 1,500 meters net effective drilling speed is about 1,820 meters per rig per month, for depths of 2,500-3,000 meters it is reduced to 871 meters, and beyond 4,000 meters it drops to 360-365 meters per rig per month. The coefficient  $\phi_3$  was 1.21 for computations for the five-year plan.

In the factor analysis of change in the requirements for equipment, an increase in the amounts of offshore drilling ( $\phi_4$ ) was considered, since special corrosion-resistant equipment is used there with a complicated system of hydraulic control of the equipment, that is, more expensive equipment. This coefficient was 1.1 for computations for the five-year plan.

The influence of negative factors that increase the base standard for the requirements was determined by the multiplication:

$$\phi_1 \phi_2 \phi_3 \phi_4 = 1.09 \cdot 1.2 \cdot 1.21 \cdot 1.1 = 1.73.$$

The coefficient  $\phi_5$ --rise in the technical level of the equipment--was determined as the ratio of the indices of growth in cost of the equipment and in its productivity. The following were adopted as the initial data for the computations: change in average well depths and penetration per bit during the base and plan periods, mechanical speed, number of bits per well, number of turbodrills per well, and so on. The computations indicated that, while equipment costs rose about 2-fold, its productivity increased 2.5-fold. The value of the coefficient  $\phi_5$  is in this case 0.79.

By improving the organization of work during well drilling and oil and gas recovery and improving the operating technology, the intensiveness of use of oilfield equipment and geological-exploration drilling equipment ( $\phi_6$ ) should increase by about 20 percent, which will reduce, in turn, the requirements for equipment, and the  $\phi_6$  coefficient will be 0.8.

The effect of technical progress and improvement in the organization of operations does not exclude completely the negative influence of the other factors indicated above, and the multiplication

$$\phi_1 \phi_2 \phi_3 \phi_4 \phi_5 \phi_6$$

was 1.09, that is, the standard of the requirements was practically stabilized.

The requirements for equipment which were determined by the factor method is correct, in all probability, because it considers the effect of all norm-forming elements of the production process.

The table shown below reflects the range of deviations in the values of the standards of the requirements, for example, for the group of equipment for drilling operational and deep exploratory wells for oil and gas, which are defined by the factor and extrapolational methods.

Year	Specific normative of equipment requirements per meter of well penetration, which is determined as follows: (in millions of rubles)		Deviation of the norms, in percent
	By the factor method	By the extrapolation method	
1973	33.3	33.3	0.0
1975	33.5	35.2	-5.0
1980	34.5	38.9	-11.0
1985	35.5	42.6	-17.0
1990	36.5	46.3	-21.5

If a similar computation of requirements is applied to oil-recovery equipment, the factors that consider worsening of the conditions for recovery will give results that increase the requirements substantially.

A reduction in the recovery of crude by the flow method and, as a consequence, conversion to mechanized recovery, as well as an increase in recovery in regions with complicated conditions, and the involvement in development of fields that contain crude high in sulfur especially influenced the increase in requirements for oil-recovery equipment.

A similar factor approach has been used to determine the normative indicators of the requirement for the subgroup of equipment for drilling geological-exploration holes and equipment for refining oil and gas.

The difference in the equipment requirements that is found by the factor method is a decrease of about 1.2 billion rubles for 10 years below the requirements computed by the standing method. This once more proves the exceptional importance of improving methods for determining the national economy's long-range requirements for equipment, in order to choose the most correct and effective way to develop machinebuilding.

With the large range in amounts of reduction of the requirements for equipment by separate group and type, and because of technical progress, it becomes necessary that plans for developing petroleum machinebuilding provide for intrabranh proportions by concrete type of equipment, without being restricted to a balancing of the plans for consumption and production just in terms of cost. For example, it is completely impermissible that drill rigs produced by Mintyazhmash plants and other ministries not be completely provided with equipment for the preparation and cleaning of drilling muds, which is produced by Minkhimmash enterprises. Thus, deep-well pumps, pumping jacks and rods for deep-well pumps should be produced proportionally by the various enterprises.

An examination of the questions of planning equipment for the oil, gas and petroleum-refining industries that was conducted has enabled mutual coordination of such aspects of the plan as the requirements for equipment; production capacity,

including the technical reequipping, rebuilding and expansion of petroleum machinebuilding enterprises; provisioning with material resources; and production volume.

We have examined only separate problems and questions about improving the planning of petroleum machinebuilding. It is important to consider more completely the consequences of mastering new regions for recovering oil and gas and of major shifts in the fields of science, equipment and technology. It is also necessary to provide for the coordinated solution of current and long-term problems and an improvement in qualitative indicators, together with an increase in production volume.

The work results of the machinebuilding industries in mastering new technology and the production of equipment for the oil, gas and petroleum-refining industries during the elapsed period of the current five-year plan yield a basis for supposing that the majestic tasks that the 26th CPSU Congress set for branches of the fuel and power complex will be solved successfully by them on the basis of domestic equipment.

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## NUCLEAR POWER

### CONSTRUCTION PROGRESS AT SMOLENSK NUCLEAR PLANT REPORTED

Moscow TRUD in Russian 14 Sep 82 p 1

[Article by V. Kapel'kin, TRUD correspondent at the construction site of the Smolensk AES, Desnogorsk, Smolensk Oblast: "The First Reactor on Line"]

[Text] On 9 September, at 1920 hours, the chief of the shift on duty at the Smolensk AES V. Zubakh, in endeavoring to be unperturbed, entered in the operations log: "The first heat-producing assembly in the fuel channel of reactor No 37-41 has gone on line."

The writing was unhurried and even, the same size as all the other entries. But if the entry were proportional to the intensity of emotions, they would be in large red letters. The collective of the AES has breathed life into the first reactor of the future power giant.

...Let us follow the work procedures of the AES personnel. First is the guard booth. The guard carefully studies the document and the photograph. Then there is the procedure of changing into comfortable white underclothing and a uniform consisting of trousers and a jacket. All the regulation clothing from the cap to socks is made from 100-percent hygienic cotton. And the footwear is neat fabric slippers with the same properties. Every one is in white like surgeons in an operating room. The only distinguishing feature is the "pen" dosimeter (the radiation counter) for visitors or a transparent small box with a black film canister fastened to a button, the mark of a permanent employee.

The route is familiar, but at the same time also new. There is not the usual gloomy gray of concrete. On the walls is a covering of pleasant tones. On the floors and stairways is a wall-to-wall yellow plastic carpet. The most splendid corridor (anodized aluminum and oak doors) has already been named the "general's."

We were at a level of 35 m. There they were, the steel doors into the central reactor room. My guide joked: "Careful, don't bang the doors." You couldn't even if you wished. The giant probably weighed no less than a ton. It took a great effort to even budge it.

On the floor of shining stainless steel, at a point with the protruding heads of hundreds of fuel channels was the main arena of the occurring action.

The physical starting up of the reactor did not involve the generating of electric power. Even heat was virtually not produced. One of the aims of the physical starting up was to determine the minimum critical load of the reactor. Of course, these amounts are calculated. But specialists assert that each of the nine channel reactors operating in the nation of the RBMK-1000 type has its own characteristic features which must be ascertained for future successful operations. Moreover, our reactor, by count the jubilee tenth one, is powered by a new fuel much more enriched than the previous.

Generally, the physical starting up can be likened to the launching of a new ship which has not been completed and is not ready to set to sea, but can already float.

The shift of V. Cheprasov reached the critical fuel mass.

The entry in the operations log read: "10 September. 1050 hours. A self-sustaining chain reaction was established!" The experienced power engineer (Viktor Gavrilovich [Cheprasov] had started up two units at the Chernobyl AES) did not restrain his emotions and they broke through onto paper in the form of a punctuation mark unusual for documents. Incidentally, they not only made exclamation marks, but also threw their white caps in the air.

Right in the central room, by the reactor, a meeting was held at which they spoke off the cuff and from their heart. Everyone around was smiling. Both the person who was dropping from fatigue and the person who had a "crusty" reputation.

But everything was in order. The shift went on watch when the 19 fuel generating assemblies rested in the reactor's channels. The instruments and calculations showed that the critical mass would be reached. They lowered the twentieth and the manual control rods were pulled out to the maximum. The smallest amount of fuel was lacking still to start a self-sustaining reaction.

They began to prepare the twenty-first assembly, the lower portion of which was a cluster of 36 pencils and included the fuel in the form of uranium dioxide.

The rigger Yu. Karlinskiy officiated. He fastened the assembly to the hook. The crane lifted it from the fuel holding tank which was next to the head. The operators removed a covering of polyethylene film from it. One wanted to go up and touch the black shining surface of the "pencils." But only Karlinskiy had the right to touch them and because he wore special gloves. There was no danger to man, simply the "pencils" were perfectly clean and grease spots could remain on them.

Karlinskiy gave a sign to the crane operator to begin lowering at a slow speed. The assembly began to descend into the reactor channel.

That did it. The start counter usually called the "clicker" was so clogged with signals that it sounded like a continuous trill....

Here was the work area of the "siur" as the abbreviation is known for the position of senior reactor control engineer. In this case, the siur is A. Ignatenko.

This 26-year-old specialist has already been present at the physical starting up of the BN-600 reactor at the Beloyarsk AES. As the "supervising physicist" he started up reactors also at the Chernobyl plant. Now he is the "siur" at the Smolensk AES, a significant figure in the shift. His career, incidentally, is not so rare. Rapidly developing nuclear power is an excellent field of activity providing rich opportunities for intelligent young persons to prove themselves and advance.

The plant's director and the deputy chairman of the State Acceptance Commission G. Kopchinskiy pointed out that the physical experiments are moving ahead strictly according to program and this shows the high quality assembly and installation of the reactor, the other systems and equipment of the first unit. There has also been good personnel training. Incidentally, this is how it should be. Precisely this was expected by both the State Commission as a whole and the chief national nuclear safety inspector N. Kozlov. The commission unanimously approved the decision on the physical starting up.

Along with B. Reva, the chief of the construction project and simultaneously the chairman of the staff of the competition in honor of the 60th anniversary of the USSR, we leafed through the protocols establishing the results of the shock weeks. Many brigades of construction and installation workers had met 1.5-2 norms per day.

When the brigade of concrete workers of the Lenin Komsomol Prize winner, V. Fedorkov, from the SU-1 [construction administration] made the appeal of having each pre-start day be a shock day and to work with the highest labor productivity, the entire construction project responded. The brigade set the example and regardless of the shift there was success.

On 4 September, a group of assembly specialists including O. Aleksandrov, A. Sorokin, V. Maslyuk and others, a total of 15 men, began comprehensive testing of the reactor safety control system, spending 10 days on the job instead of the very meager 2 weeks allocated under the program.

"You will agree that the project on the threshold of starting up is working smoothly, as never before," commented B. Reva.

On 11 September, powerful pumps on the shore of the "cooling sea" began turning and water from the Desna rushed into the open delivery canal of the plant. Along with our construction workers, Polish colleagues from the Energopol [Power Construction Association] also celebrated. They had carried out their job conscientiously, excellently and on the required time.

The construction project has reached the finish straightaway. The large collective is working in a single rapid pace, endeavoring to more quickly put into service for the nation the peaceful atom enriched by the creative energy of man. Next comes the connecting of the first turbogenerator!

[Editor's note] The editors of the newspaper TRUD, in sponsoring the construction of the Smolensk AES, share the joy of the large collective involved in building the plant and starting up the nuclear reactor and wish it new labor successes.



## NUCLEAR POWER

### BRIEFS

ATOMMASH CONSTRUCTION PROGRESS--The last month of summer is here. What is the situation at the construction sites of Atommash [Nuclear Machinery Association]? An answer to this question has been given by the review "The Basis of the Rhythm is Cooperation" published in issue No 33 (198) of the newspaper SOTSIALISTICHESKAYA INDUSTRIYA NA ATOMMASHE. The plan for the general contract in July, the article states, at the Atommash projects has been fulfilled only by 89 percent. While for the half-year results the lag was only 614,000 rubles (in June the construction workers carried out 8.5 million rubles worth of various work and somewhat improved their situation), after the 7 months of work (in July 6.7 million rubles were used), the debt since the start of the year rose to 2 million. The lag in housing construction has caused alarm. In July, the housing construction combined planned to complete 30,000 m<sup>2</sup> of housing. In fact, the city did not receive a single square meter. The leaders of the DSK [housing construction combine] have proposed that the debt be made up in August, but here the August program has been shifted back to September. Only the use of all the reserves, help to the large-panel housing construction plants in terms of personnel and the repair of metal fittings, and the organizing of triple-shift work using a rotating schedule at the plants and construction lines will make it possible to carry out the task of completing 215,000 m<sup>2</sup> of housing this year. For rectifying the situation in August, the entire collective of Volgodonskoy construction workers must carry out construction and installation work valued at 17.5 million rubles. For successfully carrying out this task, specific quotas have been set for each subdivision. Under a decision of the construction project's leadership, 10-day analysis and control over the course of carrying out the monthly plans are to be introduced. Particular emphasis has been put on the question of observing production discipline, the personal responsibility of the leaders for the unconditional fulfillment of the state plans, the creating of normal living conditions for the workers and the organizing of their meals and leisure. In the newspaper the electric welder of the steam generator shop at Atommash V. Lysenko has engaged in an interesting conversation with his comrades. His article is titled "Product Quality--Our General Concern." The materials of the joint raid by the newspapers SOTSIALISTICHESKAYA INDUSTRIYA NA ATOMMASHE and ATOMMASHEVETS have provided information on the organizing of labor by the Atommash workers during the night shift. The detected shortcomings, the raid brigade has concluded, can no longer be explained by the extended development of the collective. For this reason, it is essential to deal strictly with those who are responsible for organizing production. The newspaper has also published news from the party organizations,



comments on the labor feats of participants in the socialist competitions and replies to critical comments. From the correspondence of Kuz'ma Volgodonskoy, they have published the letter "...although dawn has not come." [Text] [Moscow: SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Aug 82 p2] 10272

NUCLEAR POWER CONSTRUCTION EMPLOYMENT--The Republic Bureau for Information and Job Placement of the Public invites the participation in building one of the major projects of the 11th Five-Year Plan, the nuclear power plant in the town of Udomlya in Kalinin Oblast. Here they will need: electrical installers and reinforced concrete installers, gas and electric welders, mechanics for control, monitoring and automated equipment and pipeline repairmen, masons and carpenters; equipment operators for bulldozers, excavators, crawler, wheeled, tower, gantry, truck and rail cranes; framing workers, plasterers, drivers for operating large trucks (MAZ and KrAZ). Persons who do not have construction specialties can acquire them by individual, brigade or course methods of instruction. At the place of employment, dormitories are provided for single persons, gratis assistance is paid for arriving at the project, travel to the work area is paid for and per diems are paid. Contracts are concluded with periods of 1 and 2 years for men between the ages of 18 and 55 and for women from 18 to 50. Conclude contracts for traveling to the shock project of the 11th Five-Year Plan! For the information of citizens! Representatives of the construction organization can be found at the bureau. [Text] [Dushanbe: KOMMUNIST TADZHIKISTANA in Russian 12 Sep 82 p 4] 10272

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## NON-NUCLEAR POWER

### IMPROVED CONSTRUCTION PLANS FOR ROGUN GES REPORTED

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 9 Oct 82 p 2

[Interview with N. G. Savchenkov, chief of Rogungesstroy by A. Pal'; date and place not specified]

[Text] Hidroproyekt [All-Union Design and Scientific Research Institute for Hydropower Projects], Rogungesstroy [Rogun GES Construction Administration] and the directorate for the plant under construction have jointly worked out a scheme for increasing construction efficiency at the Rogun GES. Our correspondent has interviewed the chief of Rogungesstroy, N. G. Savchenkov.

[Question] Nikolay Grigor'yevich [Savchenkov], what caused the working out of the plan?

[Answer] The technical plans envisage the starting up of the first unit in 1990 in carrying out around 75 percent of the total amount of the work's cost. On the basis of the acquired experience in hydropower construction as a whole for the nation, for the Nurek GES and our own Rogun, we, together with the designers and clients, have sought out the ways for maximally reducing the amount of work and the time for starting up the first units.

The starting up plan is needed to carry out only those jobs which are essential at a given stage of construction. As a result of our targets, the amount of work essential for starting up the first and second units has been reduced by 300 million rubles. We have also distributed the financing over the years of the 11th and 12th Five-Year Plans and this makes it possible most flexibly and realistically to utilize its possibilities.

We intend to block off the Vakhsh and let the construction discharges through the first construction tunnel in 1985 and through the second in the following year. Thus, the starting up of the first unit has been brought closer and has been set for 1989. In accord with this, we have calculated the required number of workers and the amount of housing and sociocultural and domestic facilities to be completed in Rogun. The starting up plan indicates the future in terms of construction stages and instills confidence in the workers, engineers, technicians and everyone who has come to build this great project.

[Question] Please tell us what new decisions have been taken in working out the plan.

[Answer] In erecting the world's highest dam (335 m), for the first time we will employ a cyclical-flow system for delivering building materials by heavy conveyor lines. The construction of them under the conditions of the Rogun GES is an extremely complicated matter. Initially, for the route of the conveyor along the left bank of the Vashkh, we planned to build three guy-wire bridges across gulches from the quarry to the dam. These were major, expensive structures and in parallel a road was also required. But bridges are temporary structures since they are needed only for the period of delivering the materials and then are caught in the flood zone. We proposed making tubular crossings through which the road would run along with the conveyors.

According to the initial plans, 2,800 m of tunnels had to be cut for the conveyor. This was expensive and would require a great deal of time. The designers found an opportunity in certain places to bring the conveyor from underground to the surface. Now tunnels totaling just 1,250 m in length are needed.

A single module has been adopted for all the conveyors. Such standardization of the assemblies has facilitated the manufacturing, installation, operation and particularly repairs.

It was decided in the first stage to shorten the length of the construction tunnels by one-third. This significantly reduced the "peak" amount of work for the drillers in 1985-1986.

For shortening the time and reducing the cost of construction, our rock workers, blasters and installation workers under very difficult mountainous geological conditions are laying a road along the Vakhsh involving the construction of two bridges. At the end of this or the beginning of next year, we will "settle" the presently unreachable downstream and open up an additional vast front for underground and excavating work.

There are also other proposals which are in the stage of elaboration.

[Question] The introduction of the cyclical-flow delivery of construction materials by conveyor lines is an innovation for construction workers. The experience of Nurek is insignificant and there are no specialists. How will this problem be solved?

[Answer] The first conveyor line 4½ km long according to the plan should be in operation in mid-1984. However, we plan to put it into work a half year ahead of time. This will also be schooling in the installation, adjustment, starting-up and operation. Here we will begin to train specialists. There is time enough for this. We will also learn under production conditions. The conveyor will deliver gravel for the crushing and grading system.

[Question] Increased construction efficiency is primarily the fulfillment of the plan and the improvement of all economic indicators. Financing also depends upon this and for now this has not achieved the required amount....

[Answer] It is our own fault. While Rogungesstroy has managed to meet the plan with its own forces, the subcontracting organizations have pulled it back. This is particularly true of Gidrospetsstroy [Special Construction Administration for Hydropower Projects], the SMU PGS [Construction-Installation Administration for Industrial-Civil Construction], Santehrabot [Construction Administration for Sanitary-Technical Work], the DSU-1 [Housing Construction Administration] and others. For example, Gidrospetsstroy does not possess the required number of specialists or drilling equipment. The SMU PGS, the head contractor for building panel housing, in having a broad work front, skilled assemblers and finishers, is behind due to the extremely uneven delivery of panels by the Ordzhonikidzeabad DSK [housing construction combine]. Santehrabot has not carried out the required amounts of work basically due to poor organization of labor. The questions of material and technical supply are not sufficiently settled. Measures are being taken. The immediate future will show how effective they are.

[Question] The designers, the client and the general contractor usually do not always see eye to eye. Work on the plans to increase construction efficiency at the Rogun GES has shown that they can collaborate very beneficially. This was said to me directly and frankly by representatives of Gidroproyekt, that is, professional and constructive contacts with the general contractor had been found. What is your opinion on this?

[Answer] The principle of "from mutual complaints to mutual aid" has long shown its best side. We do have a mutual understanding. The work was interesting. I feel that a good beginning was made to working shoulder to shoulder and this primarily aids in constructively settling questions of any complexity. The building of such a giant as the Rogun GES under difficult mountainous geological conditions requires a maximum effort by everyone. We have more than enough problems of the most diverse sort. In a number of instances an effective decision is essential.

[Question] One last question. Many plants, design and other organizations of the nation are involved in building the Rogun GES. How is their experience being employed in settling technical questions which arise here?

[Answer] We endeavor to introduce everything that is suitable for us. For the conveyors we have been given great help by the All-Union Scientific Research and Design Institute for Underground Transport Machine Building. The Mining Institute in Sverdlovsk has shared its experience in calculating methods. The designers have gained much that is useful from the special design-engineering bureau at the Institute for Geotechnical Mechanics under the Ukrainian Academy of Sciences. Lengiproruda [Leningrad State Design Institute for Ore Mining] has promised to help us solve the questions of employing gravity-fed transport for building the dam. One could mention a whole series of other organizations. The entire nation is helping provide the economic and social development of this mountainous region.

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## NON-NUCLEAR POWER

### CONSTRUCTION PROBLEMS, PROGRESS AT NOVOANGRENSKAYA GRES VIEWED

Moscow EKONOMICHESKAYA GAZETA in Russian No 30, Jul 82 p 18

[Article by N. Shteynberg from Angren in Uzbekistan: "The Construction Site Needs Support"]

[Text] The Novoangrenskaya GRES, after the full completion of construction, will be one of the largest in Central Asia.

By the end of the five-year plan, two power units with a capacity of 300,000 kilowatts each should be on line. The power construction workers have determined to have the first one in operation a year ahead of schedule.

The power plant is being built away from inhabited areas. For this reason, the project includes the power workers settlement of Nurabad or "City of Light." Up to now, 21,000 m<sup>2</sup> of housing, a nursery, stores and cultural-service facilities have been built. This year they plan to complete another 10,000 m<sup>2</sup> of housing area in the new buildings.

The smooth work of the construction workers, the originality of the design decisions and the advanced organization of the project have shortened the path to the goal. In particular, the brigade contract has developed widely at the project. In using the progressive method, the brigades of A. Sharipov, A. Myuller, Kh. Ashirkulov and K. Shinanov have significantly overfulfilled the quotas.

The early completion of the projects has also been aided by the competition following the principle of the "Worker Relay" with the supplier enterprises of the Angren Ceramic Combine and the Begovat Metallurgical Combine. However, the attempts of establishing the same contacts with a number of other partners has been unproductive. Moreover, many construction materials are received literally "off the truck" and this slows down the construction pace and prevents fulfillment of the plan. The construction site constantly feels a lack of steel and reinforced concrete elements. How could there not be interruptions if Soyuzgidroenergostroy [?All-Union Association for Hydropower Construction] delivers a little more than one-half the planned amount of cement?

The power construction workers are also disturbed by the question of laying a track from the basic rail line to the construction site. By their own forces, they built the spur and roughed out the network of station tracks. The tracks

were laid, but there are no switches as their delivery has been held up by the enterprises of the Ministry of Railroads. For a long time the project has been waiting for the delivery of new track for assembling the crane tracks by the main building of the GRES.

The initiative of the 2,000 members of the construction administration of Uzbekgidroenergostroy [Uzbek Hydropower Construction Trust], in having decided to reduce the time for completing the power plant, should find proper support from all construction participants.

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## NON-NUCLEAR POWER

### SMALL HYDROPOWER PLANTS FOR IRRIGATION URGED

Frunze SOVETSKAYA KIRGIZIYA in Russian 17 Sep 82 p 2

[Unattributed article: "Microhydropower Plants--The Irrigator"]

[Text] "...To increase the scale of using replenishable energy sources (hydraulic, solar, wind and geothermal) in the national economy."

(From the Basic Directions for the Economic and Social Development of the USSR for 1981-1985 and for the Period Up to 1990)

The use of microges [microhydropower plants] developed by Kirghiz specialists opens up a broad path for intensifying agriculture in remote alpine regions of the nation.

...The present September in the Tyan-Shan abounds in the hues of late autumn. The grass has been rapidly dried by the hot, arid summer and the leaves of the shrubs have yellowed. But here on the high Chon-Kurchak Plateau where the lands of the Sovkhoz imeni Strel'nikova lie, there is a rich stand of grass. The next cutting is underway. From a height of almost 100 m, the water is brought here from a glacial stream by a system of electric pumps.

The entire irrigation set-up is operated by electric power which is generated by a microges. It includes just four assemblies--the water intake, the pressurized pipeline, the hydropower unit and the control system. For normal operation of a 30-kilowatt plant, a small river is required with a discharge of 400 liters per second and a channel grade of just several degrees. In addition to the irrigation unit which includes a daily control pool, channels and a system of gates, the microges can provide electric power for the field encampments.

At present, the developers of the irrigation unit are working out an automated control system for the water distribution processes. This will provide an opportunity for one operator to control the entire work cycle.

The economic effect from the use of microges is obvious. The laying of a 12-km power transmission line through the mountains would cost the farm 30,000 rubles while the GES cost several-fold less. This, so to speak, is the direct benefit,

but if one also considers those tasks which the party and government have set for saving energy resources, the invention assumes a much weightier importance.

"Our republic possesses rather significant holdings of land suitable for intensive farming," said Candidate of Technical Sciences and Director of the Water Automation and Metrology Design and Engineering Institute, K. A. Tokombayev, one of the developers of the microges, in a talk with a KirTAG [Kirghiz Telegraph Agency] correspondent. However, a large portion of the resources lies in the alpine zone. At present, these lands, regardless of the favorable climatic and soil conditions, are little productive and here it is virtually impossible to have a gravity-fed water supply. The use of pumping stations is limited due to the absence of power transmission lines in the inaccessible areas. At the same time the mountain pastures of Kirghizia are located in the zones where rivers arise possessing sufficient energy potential. According to the estimates of specialists, the comprehensive use of these resources using microges will make it possible to provide water to virtually all the alpine pastures. As a result of this, it would be possible to pasture an additional more than 1.5 million sheep.

Extensive use of microges would significantly accelerate the electrification of the remote alpine areas where there is no possibility to build power transmission lines for this is simply unprofitable. At present, the nation's livestock raisers and lumber workers use diesel plants and annually consume over 100,000 tons of oil products. The miniature hydropower plants, according to preliminary estimates, would make it possible to save a quarter of this fuel. Our colleagues, specialists from other institutes, have already developed several versions of portable hydraulic plants with a capacity of 1.5 and more kilowatts. These light units could be delivered to their destinations by pack animals. They are easy to assemble, dependable to operate.

Also promising are the areas of use of other replenishable energy sources such as solar and geothermal as well as the production of biogas from manure and the biomass of plant remains, for example, guza-paya. In our republic the number of sunlight hours reaches 2,000-3,000 a year while solar power can be widely employed for heating, hot water supply, cooling and air conditioning, the freshening of water, the drying of hay and other agricultural products, for heating hothouses and preparing food. The profitability of employing solar power is confirmed by practice.

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## NON-NUCLEAR POWER

### PROGRESS IN TURKMEN RURAL POWER CONSTRUCTION DESCRIBED

Ashkhabad TURKMENSKAYA ISKRA in Russian 19 Sep 82 p 2

[Article by V. Krashenninnikov, TURKMENSKAYA ISKRA correspondent: "Electric Power for the Countryside"]

[Text] The supports for the power transmission line had reached Zakhmet Station on the Karakum Canal. These are destined for the laying of a high-powered transmission line over which electric power will be delivered to the projects of the Zeidskoye Reservoir which is the largest project under construction in Turkmenistan. The collective of the PMK-7 [mobile installation column] of Turkmensel'elektrostroy [Turkmen Trust for Rural Electrical Construction] must install scores of steel structures and lay the "double-link" line of wires under difficult conditions of roadless deserts. For the first time in Turkmenistan the supports are being delivered to their destination by barge along the Karakum Canal.

"The construction of the power transmission line to the Zeidskoye Reservoir is one of the main projects of the year for our collective," said the chief of the Production-Technical Section of the Trust, B. Abayev. "The putting of it into operation at the designated time will make it possible to provide the hydro-construction workers with power and a broader workfront for building the 'sea.' The purpose of the reservoir, the first stage of which should be in operation by the end of this five-year plan, is difficult to overestimate. According to the plans, it will store several billion cubic meters of water. This will provide an opportunity to ensure a stable water level in the Karakum Canal over its entire length year-round. A rise in the availability of water is one of the main conditions also for successfully carrying out the tasks of the Food Program by the republic's agriculture."

During these days, our construction workers are hard at work. At one time, due to the fault of the support suppliers, construction of the power transmission line fell behind. It was the task of the trust's workers to make this up. Much as been done for this. On the route, intense work is underway to prepare the foundations for the supports. A number of these is already ready.

The trust's collective has a significant amount of work to also do in increasing the amount of energy available in the republic economy. Particularly for those who are located in the zone of the Karakum Canal. Recently, a power

transmission line was put into operation in Gyaurskiy Rayon over which current was delivered to pumping stations for the kolkhozes and sovkhozes on the Karakum River. A power transmission line of the same purpose is being built in Bakhardenskiy Rayon. Work is on schedule and it will be in operation by the year's end.

The workers of the trust have promised to complete the annual power construction program ahead of time and this will aid in successfully carrying out the measures outlined by the Food Program.

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## NON-NUCLEAR POWER

### BRIEFS

**TURKMEN POWER PROGRESS**--The expansion of the Krasnovodsk TETs imeni 50-Letiye Oktyabrya will make it possible to double the output of electric power in the west of Turkmenistan. The construction of the important project of the five-year plan is picking up pace. Here they have erected a 180-m smokestack. The preassembled boiler foundation has been installed. They have commenced installing the turbo units in the turbine section. The plant's first unit the power of which is 210,000 kilowatts should be in operation next year. This will improve power supply to the gas and oil fields, the chemical and other enterprises. By 1985, electric power output in Turkmenia should increase by 1.8-fold. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 19 Sep 82 p 2] 10272

**SURGUT POWER PLANT**--Surgut (Tyumen Oblast). Commercial current has been produced ahead of time by the 14th power unit of the Surgut GRES, a plant operating on associated oil well gas. Its capacity is 180,000 kilowatts. This unit, in contrast to previous ones, is also used for central heating supply. It will generate not only electric power, but also heat. This is very important under the conditions of the Far North as up to now Surgut has been heated by numerous mazut-fired boilers. The operators have taken over the acceleration baton from the construction workers. They have resolved to bring the new power unit up to designed capacity by the year's end, 4 months ahead of the normed time. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 12 Oct 82 p 1] 10272

**AIR-STORING POWER PLANTS**--Scientists and specialists from seven ministries have pooled their efforts for developing a fundamentally new type of large power plant. In contrast to existing ones, the air-storing gas turbine power plant (VAGTE) will not only generate but also store up electric power. Hero of Socialist Labor, Academician M. Styrikovich describes what has brought about the development of the VAGTE as well as its design features. In all industrially developed nations, power consumption has a common trait of unevenness. During the nighttime this is minimal. In the morning with the starting up of the plants, factories and municipal electric transport, the load on the power plants sharply rises. During the dinner hours, it declines somewhat. The abrupt shifts in electric power consumption have posed a difficult problem for the specialists. How is it possible to dependably supply industry with electric power during the hours of the greatest demand for it and economically utilize the capacity of the electric plants during the nighttime? In other words: from where can power be taken during the day and where can its surplus be put during the night? One of the actual ways has been the building of the pumped

storage electric power plants (GAES). The first GAES with a capacity of 225,000 kilowatts is successfully operating near Kiev. Another two are under construction: Zagorsk in Moscow Oblast with a capacity of 1.2 million kilowatts and the Kayshyadoris in Lithuania with a capacity of 1.6 million kilowatts. On flat territory, for satisfying the "peak" energy requirements, it is preferable to build the air-storing gas turbine power plants (VAGTE) which operate on stored compressed air. The plan for constructing them has been drawn up by the involved ministries under the leadership of the Thermal Power Section of the Scientific Council for Interdisciplinary Energy Problems of the USSR Academy of Sciences. The functions of general designer have been assumed by Teploelektroproyekt [All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures]. At present, the plans are being developed for the first VAGTE with a capacity of around a million kilowatts. What is its principle of operation? During the nighttime, powerful compressors driven by the surplus electric power of nuclear or thermal power plants will force air under a pressure of 70 atmospheres into underground storage capacity. Over a night shift, the units will pump around 20 million m<sup>3</sup> of air. During the day, during the hours of increased demand for electric power, it will be generated by the electric generators of the gas turbines located at the VAGTE. The compressed air for the turbine combustion chambers will be supplied from the underground storage without expending energy on operating compressors. Each day the VAGTE will produce around 8 million kilowatt hours of electric power, as much as a large thermal plant produces. [By R. Akhmetov, Moscow] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 24 Oct 82 p 2] 10272

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## PIPELINE CONSTRUCTION

### PROGRESS IN BUILDING URENGOY-NOVOPSKOV, URENGOY-UZHGOROD GAS PIPELINES TOLD

#### Urengoy-Novopskov Pipeline

Moscow STROITEL'NAYA GAZETA in Russian 3 Oct 82 p 1

[Article: "Gas Pipelines Are the Country's Central Construction Projects"]

[Text] Fact:

Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] and Mingazprom [Ministry of Gas Industry] have adopted a joint decision to speed up introduction into operation of the compressor stations on the Urengoy-Novopskov gas pipeline.

Commentary:

Deputy Minister of Construction of Petroleum and Gas Industry Enterprises S. Arakelyan:

"We shall turn it over ahead of time.

"The line work on the Urengoy-Novopskov gas pipeline route has practically come to an end. Less than 150 kilometers of pipe remain to be welded and laid on the 3,340-kilometer trunk line. The socialist commitments about the new gas trunk line that the gas-line workers adopted in honor of the 60th anniversary of the founding of the USSR have been carried out ahead of time.

"Thanks to the selfless labor of the operating flow-line group collectives that took part in the erection of this, the third superlong-distance trunk pipeline in a row during the current five-year plan, it is absolutely possible to turn it over for operation, just like the predecessor Urengoy-Gryazovets-Moscow and Urengoy-Petrovsk gas pipelines, very much in advance of the planned deadline.

"Now the whole business is to introduce into operation the compressor stations that will provide for transporting the gas from West Siberia to the Ukraine.

"In considering the actual possibilities, Minneftegazstroy and Mingazprom adopted a decision to cut the period for introducing all 23 compressor stations on the Urengoy-Novopskov trunk pipeline by as much as 1-6 months. While, for example, initially the Kungurskaya KS [Compressor Station] was to be put into operation in June 1983, its startup is now planned for the end of December this year. Correspondingly, the

introduction of the Gornozavodskaya KS has been shifted from March of next year to December of this year.

"The total time won for all the compressor stations will be more than 80 months.

"In accordance with the new and shorter deadlines, measures have been initiated to speed up the preparation and transmittal of complete sets of technological and electric equipment, monitoring-and-measuring and automating equipment, and shut-off fixtures for installation. Deliveries of all the necessary constructional structure and materials also have been accelerated. Measures have been worked out for the most rapid redeployment of people and technical resources from the Urengoy-Petrovsk route compressor stations. The possibility of allocating a large amount of new equipment, including welding units, automotive cement carriers, K-700 tractors and lift trucks to collectives engaged in erecting compressor stations on the Urengoy-Novoposkov trunk line is being explored.

#### Urengoy-Pomary-Uzhgorod Pipeline

Moscow STROITEL'NAYA GAZETA in Russian 3 Oct 82 p 1

[Article: "Urengoy-Pomary-Uzhgorod: 1,000 Kilometers of the Route"]

[Text] In the last issue of STROITEL'NAYA GAZETA we reported the latest achievement of the builders of the Urengoy-Pomary-Uzhgorod transcontinental gas pipeline: the first 1,000 kilometers of pipe had been welded into the "strand" ahead of the plan deadline.

Today we tell how the workers on the route achieved their success.

#### 1. The Beginning

The flow-line groups of Hero of Socialist Labor Il'sur Shaykhutdinov from Tatnefteprovodstroy [Trust for Oil Pipeline Construction in the Tatar SSR], Goris Kushka from Soyuzgazspetsstroy [All-Union Trust for the Construction of Special Gas Industry Facilities] and Leonia Mikhel'son, one of the youngest supervisors of the integrated operating collectives, first went to work on the West Siberia-West Europe route in May of this year.

It is always difficult to start. And it was doubly difficult on the export pipeline route. Here they had to undertake at once a pace that pipeline builders had never known before. To produce a kilometer of gas pipeline per day--that was the goal set before the pioneers. And they made it. But before the glitter came, the experience that had been built up on the Urengoy-Novoposkov route was polished up, optimal working and living conditions were created, and "Workers' Relay" agreements were concluded with the cooperating organizations. All three flow-line groups converted to operation under a single job order, and they began to be paid according to the final result--for each finished kilometer of gas pipeline.

A multitude of questions still had not been resolved before June, and the pioneers laid altogether no more than 2 kilometers of line. But already in the first month of summer each flow-line group made up to 1,000 meters of gas pipeline per day.

A telegram for this issue:

"Tests of the new Novopskov-Aksay-Mozdok and Mozdok-Kazi-Magomed trunk gas pipeline system were completed the other day."

Siberian gas will now flow through North Osetia and Chechen-Ingushetia, and through Dagestan and Azerbaijan, to the terminating point of the new underground gas river--the Kazi-Magomed Compressor Station, and it will be joined with the Transcaucasus trunk gas pipeline system.

## 2. Over a Wide Front

The undertaking was begun in earnest in the summer, when most Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] subunits, after completing work on the Urengoy-Novopskov line, transferred to the export trunk line. A feature of this undertaking, which did not allow one hour to be lost in vain, is the combining of the preparatory work on the buildup of the housing settlements and the approach routes and the creation of the welding bases that will work directly on the line. The foresight of the highest management element of gas-transport systems construction and of the designers who planned the laying of all the trunk gas pipelines from West Siberia in a single operating corridor also aided this achievement. And, of course, the experience of those who came to the export branch first.

In June 75 kilometers of pipe were welded into the strand. Simultaneously, a concentration of material and labor resources went to the project and advanced operating methods were worked out.

When you look today at the pace of growth of welding and insulating operations, you will be very much surprised: back in September 350 kilometers of pipe had been welded into the strand, and the output per insulation worker increased 10-fold to 12-fold during the three summer months.

During this time tests were begun of powerful new domestic equipment for building gas-transporting systems and of clad pipe. This was the result of the patriotic initiative of the collectives of enterprises of a number of ministries that responded to the economic sanctions of the Reagan administration by speeding up the production of equipment, constructional structure and materials for gas pipelines.

The creation of the new gas streams that have their start in Urengoy have actually become a nationwide affair.

## 3. The 1,000-th kilometer.

Chief engineer of the Central Control Section of Minneftegazstroy A. Khor'ko called the editorial office on 30 September:

"I have just sent you a telegram: the 1,000-th kilometer of the Urengoy-Pomary-Uzhgorod route has been welded into the strand."

"Whose flow-line group?" we asked Aleksandr Mikhaylovich, and we found out right away that he could not answer: the thousandth kilometer of pipe, the last steel multiple joint, could have appeared at once on several segments.

The last seam could have been welded by the flow-line group of I. Razanov or S. Mu-zhiv, who completed on this day, far ahead of time, assembly of its 240-kilometer section of the trunk line, from Algasov to Yelets.

Or by the group of State Prizewinner B. Diduk. This collective, still the only one in the country, mastered the so-called island method of laying pipe, and did not stop work during the summer on the head section--in West Siberia. The flow-line group progresses 150-200 meters in a day, laying roads from one piece of dry land to another in the swamps.

Or the flow-line group of S. Gevorkyan from the Transcaucasus Gas Pipeline Construction Administration. In September this collective established an unusual record: working under the most difficult conditions of Carpathia, the group laid 15 kilometers of pipe in the mountains. This is still an unprecedented result in world pipeline-construction practice for such a locality! Gevorkyan's workers have started toward the boundary marker and are preparing to link the Soviet gas transport system with West European gas pipelines.

But is it so important who completed this step, who reached this point? It is much more important to note that the 1,000-th kilometer is a common victory for dozens of subunits.

As Aleksandr Mikhaylovich Khor'ko reported to us yesterday, 1,116 kilometers of pipe had been welded into the strand of the Urengoy-Pomary-Uzhgorod trunk line on 2 October 1982.

#### A Settlement Gets Ready for a Greeting

A cozy village has risen up close to the rayon center of Mironovka, in Kiev Oblast. It will house builders of the Urengoy-Pomary-Uzhgorod gas pipeline. This is the first community of this type on the 394-kilometer segment of the route that has been charged with accommodating representatives from the Ukraine. The main detachment of line workers who have already fulfilled their task of laying the Urengoy-Novopskov gas pipeline will soon arrive here.

The pipeline-route workers' village has been equipped with electricity and radios. Television antennas have risen over the roofs of the little houses. These houses that were erected in the settlement differ considerably from the traditional mobile housing. Many of them are to have additional premises for storage and for drying clothing, and kitchens. (V. Gol'dman)

#### A Report for This Issue

Izhevsk. The first pipe has been welded into the Udmurt segment of the Urengoy-Pomary-Uzhgorod gas pipeline.

The important step in the operations began on the 150-kilometer stretch of the trunk line that crosses the autonomous republic from east to west, passing through forest thickets and swamps and over streams. There will also be serious water obstacles: the Kama and Vyatka rivers. Startup of the large welding base in the city of Mozhga preceded the direct commencement of work on the route by the builders. (TASS)



## A Tunnel under the Trunk Line

Tyumenskaya Oblast. The integrated welding and assembling brigade of B. Diduk has completed a unique technological operation during the construction of the Urengoy-Pomary-Uzhgorod pipeline. It managed to lay a 300-meter section of the new gas pipeline under existing gas trunk pipelines without shutting them off.

...At this place the line to Uzhgorod intersects the "corridor" of the existing multiple-strand Medvezh'ye-Urals-Central Economic Region gas pipeline system. The specialists suggested that a tunnel be laid under them, where the trunk line being built could take a "dive." The whole difficulty lay in the fact that the work should be done without shutting off these gas pipelines--hundreds of millions of cubic meters of gas were passing through them each day.

When the tunnel had been prepared the welders went down into it. Observing caution, they built up the underground crossing not with the traditional multiple joints but with one pipe a time. Each stage of the experiment was provided with reliable engineering support. Water had to be pumped out constantly because of rain.

And now the pipe has been wrapped in protective film, the ditch is covered over, and there is no longer anything to remind one of what high skills the pipeline workers displayed here. And B. Diduk's brigade has advanced 300 meters closer to Uzhgorod. By the end of the year it will have assembled 60 kilometers of gas pipeline. (TASS)

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## PIPELINE CONSTRUCTION

### WORK ON CARPATHIAN PART OF URENGOY-UZHGOROD GAS PIPELINE SUPPORTED

#### 'KOMMUNIST' Sponsors Carpathian Segment

Yerevan KOMMUNIST in Russian 22 Oct 82 p 1

[Editors' note]

[Text] In considering the great importance of construction of the Urengoy-Pomary-Uzhgorod gas-export pipeline, KOMMUNIST has decided to undertake sponsorship of the Carpathian segment of the route, which a collective of the Transcaucasian Pipeline Construction Administration is laying. Our special correspondent V. Danilov is now flying to Carpathia. In the next few days the KOMMUNIST general correspondent's center will start to operate there. Relying upon it, the newspaper will regularly tell about matters on this most important new construction project of the five-year plan and will propagandize advanced experience and introduce it widely

#### Armenian Komsomol Undertakes Sponsorship

Yerevan KOMMUNIST in Russian 22 Oct 82 p 1

[Interview with L. Aslanyan, manager of the Komsomol Shockwork Construction Projects Sector of the Komsomol Central Committee of Armenia, by A. Shkulev: "The Komsomol Undertakes Sponsorship"]

[Text] The Central Committee Bureau of the Komsomol Central Committee of Armenia adopted a decree about sponsorship of the republic's Komsomol members and youth during construction of the West Siberia-Central Economic Region gas pipeline and the Urengoy-Pomary-Uzhgorod export gas pipeline.

KOMMUNIST correspondent A. Shkulev asked the manager of the Komsomol Shockwork Construction Projects Sector of the Komsomol Central Committee of Armenia, L. Aslanyan, to tell what practical steps are being taken to implement Komsomol's sponsorship.

"It is planned first of all to promote widely among the republic's Komsomol members and youth agitation and propaganda work that will explain the goals of increasing the recovery of Siberian gas and transporting it to the country's central regions that were set by the 26th Party Congress and the November 1981 CPSU Central

Committee Plenum and the political importance of the timely erection of the Urengoy-Pomary-Uzhgorod gas export pipeline.

"A staff on sponsorship over erection of the system of trunk gas pipelines that will run from West Siberia to the central regions of the European part of the USSR and the Urengoy-Pomary-Uzhgorod export gas pipeline was created under Armenia's Komsomol Central Committee. It will monitor the high-quality and timely fulfillment of the orders on the shockwork construction projects for the oil and gas industry of West Siberia, support and disseminate valuable beginnings and initiatives, and develop competition under the Workers' Relay principle.

"One hundred young men and women will be sent each year on Komsomol work tickets for construction of the Urengoy-Pomary-Uzhgorod export gas pipeline. A shockwork Komsomol detachment of republic volunteers, numbering 60 people, has been formed up and put at the disposal of Uralneftegazstroy [Trust for Construction of Oil and Gas Industry Enterprises in the Urals Economic Region]. The detachment's composition includes installers, welders, concrete workers, plasterers, painters, carpenters, and builders of other trades. They will work on construction of the Staraya Lyalya Compressor Station in Sverdlovskaya Oblast. By the end of the year another 60 young men and women will leave Armenia for the shockwork construction project.

"Concern about organizing cultural, recreational and domestic services for youth occupies a special place in the Komsomol's sponsorship. Political and artistic literature, republic newspapers and magazines, and sports and cultural equipment will be sent out periodically to the country's gas construction projects. Poets, artists of the stage, and independent youth collectives will be frequent guests of the young gas pipeline builders.

"The republic's Komsomol members and youth have already acquired first-hand experience in work at a great construction project of the five-year plan--the laying of the superlong-distance Urengoy-Pomary-Uzhgorod transcontinental gas pipeline. This summer two student construction detachments of 80 people from the Yerevan Institute of Physical Culture and the Kirovakan Branch of the polytechnical institute did their labor semester in the Mariyskaya autonomous republic.

"They took part in the construction of the Pomary Compressor Station, carried out ahead of time the commitments undertaken and did 100,000 rubles' worth of additional construction work. Armenian students extended patronage assistance to neighboring kolkhozes and organized for the gas pipeline builders and the local populace an evening of friendship among nationalities, readings and other interesting things. The labor and social work of the Yerevan and Kirovakan students received a positive evaluation by local party and Komsomol organizations.

"The experience of our pioneers on the Urengoy-Uzhgorod gas pipeline route and the measures planned by Armenia's Komsomol Central Committee Bureau helped to raise the labor enthusiasm of the young builders and to accelerate construction of the country's gas trunk pipelines."

## Progress Report from Carpathia

Yerevan KOMMUNIST in Russian 22 Oct 82 p 1

[Article: "This Is a Record for a Flow-Line Group"; passages rendered in all capital letters printed in boldface in source]

[Text] A report has come from the Central Control Section of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises]: the technological flow-line group of S. Gevorkyan established a singular record in September on the Urengoy-Pomary-Uzhgorod export gas pipeline: working under the difficult conditions of Carpathia, the collective laid 15 kilometers of pipe in the mountains. **THE RESULT IS UNPRECEDENTED EVEN IN WORLD PIPELINE-CONSTRUCTION PRACTICE FOR THIS TYPE OF LOCALITY.**

It is known that S. Gevorkyan's collective of gas-industry builders undertook a commitment in honor of the 60th anniversary of the forming of the USSR **TO LAY 60 KILOMETERS OF GAS PIPELINE ON THE CARPATHIAN ROUTE IN 1982.**

How has this commitment been fulfilled? According to data received by the Transcaucasus Pipeline Construction Administration Controller, 57 kilometers of the route had been cleared, 48.4 kilometers of ditch had been excavated, 54.9 kilometers of pipe had been rotary welded and 53.1 kilometers overhead welded, 48.5 kilometers of pipe had been insulated, and 46.7 kilometers of pipe had been laid in the ditch, and 44.5 kilometers of gas pipeline had been backfilled on 5 October 1982.

These figures testify graphically that, thanks to its selfless labor, the collective of S. Gevorkyan's technological flow-line group has a real potential for turning over a 60-kilometer section of the route for operation ahead of time.

Right now the builders are headed for the border marker and are preparing to link the Soviet gas-transport system with Western Europe's gas pipelines.

### Mountain Pipeline Building Details

Yerevan KOMMUNIST in Russian 22 Oct 82 p 1

[Article by I. Gorkun, stringer for KOMMUNIST (Uzhgorod): "The Line Ascends the Mountains"]

[Text] **It has long been the custom of the Soviet people that the whole country erect each large construction project.** Practically every republic of the Union of SSR's has been involved now in erecting the Urengoy-Uzhgorod transcontinental gas pipeline. Armenia's workers are adding a major mite to the common affair. Mobile electric-power stations and generators, compressors and transformer substations, gas-welding and gas-cutting equipment--this is a far-from-complete list of what Armenian enterprises are sending to the gas pipelines that have their start in Siberia.

"One kilometer of pipeline per day!"--this is the motto of Armenia's builders on the western segment of the line for the "blue flame" that is passing through the Carpathians. They reached this indicator on the gas lines from Urengoy to Petrovsk and to Novoskov.

"We are working two consolidated integrated industrial-type flow-line operating groups in the Carpathian section of the gas pipeline, which are manned by builders of all specialties," says S. Kozinyan, chief of the Transcaucasus Pipeline Construction Administration. "The industrial-type flow line supervised by S. Gevorkyan has taken its path from the zero marker at the Bogorodchanskaya Compressor Station to the border of fraternal Czechoslovakia. And the collective of the second flow-line group under M. Gambar'yan is moving from Uzhgorod to meet him. One difficult obstacle that must be overcome faces both flow-line groups: the mountain chain of the Carpathians, with steep rises and descents, with sections where the land slips. But the pipeline-route workers have good experience in tackling mountain jobs, and, moreover, they have reliable domestic equipment in their hands."

The route of the future trunk pipeline is visible in the distance from the first summit that stands in the builders' path. Here, close to the village of Duba, Rozhnyatovskiy Rayon, Ivano-Frankovskaya Oblast, the Urengoy-Uzhgorod gas pipeline begins the ascent into the Carpathians.

S. Gevorkyan, chief of the first operating flow-line group of the Transcaucasus Pipeline Construction Administration, is in a good mood. He has just now reported by walkie-talkie that the tenth "mountain" kilometer of the steel strand has been laid ahead of schedule.

"Of course, we are conquering not Everest or even Ararat," says Senik Vazgenovich, with a characteristic southern accent. "Magura rises up only to 1,360 meters, but it is more difficult for us than for mountain climbers. Suffice it to say that each pipe weighs 8 tons. Moreover, the slopes are so steep that the heavy equipment must secure itself in position with strong cables."

Our collocutor is one of the youngest supervisors on the construction project: he is not yet 40. But S. Gevorkyan's work record is already extremely sound. He took part in erecting the Urengoy-Novopskov and Urengoy-Petrovsk gas trunk lines and the Tolyatti-Odessa ammonia pipeline.

However, experience is experience, and much remains to be learned. The present complicated route is not sparing in difficulties and tests. For example, the Lomnitsa River rose above its banks at night because of torrential rains at the builders' settlement in Yasen' village, where the main pipe racks are located. Without stopping work, people were mobilized for the erection of dikes and the restoration of bridges. The struggle with the elements continued for 3 days, and the equipment and buildings and structures were saved.

And at an altitude of 600 meters, the route's workers encountered a real swamp. They successfully laid across it a strong floor made of birch logs, which was not called for by any kind of technology.

But still, neither complicated conditions nor the caprices of the weather are capable of influencing the precise rhythm of the construction project. The slogan that dictates it, which can be seen everywhere, even on the pipes that are readied for welding: "Each kilometer of the gas pipeline ahead of schedule!"

R. Yemanidi's brigade, where real masters of the welding flame are working, came out as initiator of the competition. They are saving as much time in welding each kilometer of pipe as would be needed to link up another 50 meters. The quality of

the work, which is checked by means of radioactive isotopes, is excellent. Each day an average of 500 meters of pipe is being welded onto the stream.

Foreign-made units are working along with Soviet equipment.

"Our partners, despite the pressure of the USA's administration, are continuing to make deliveries," says S. Gevorkyan. "Good equipment is arriving from Japan, the FRG and France. So it is, you see, that the work does not depend upon American machinery and equipment."

And there is still one more remarkable aspect of the Armenian builders. As zealous proprietors, they leave behind them on the finished sections land that has been recultivated with precision. Jointly with the Kiev designers, they carefully studied the peculiarities of each of the 128 kilometers of their segment.

The net-type sign at the settlement's central avenue reports the collective's main commitment: "By the 60th anniversary of the forming of the USSR, we shall lay 60 kilometers of pipe." However, it is now considered that this goal will be reached 10 days ahead of the deadline.

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## PIPELINE CONSTRUCTION

### PIPELINE WORK IN CARPATHIANS PROGRESSES DESPITE DIFFICULTIES

Moscow PRAVDA in Russian 29 Oct 82 p 2

[Article by V. Vasilets (Ivano-Frankovskaya Oblast): "The Mountain Kilometers Are Difficult"]

[Text] The water in the Lomnitsa is, they say jokingly, up to a bird's knee. That's right now, when there is a high clear sky above the Carpathians. But when storm clouds come up suddenly and a downpour splatters the ground, jokes about the river are bad. The raging mountain stream carries rocks, washes away bridges and breaks everything in its path.

The gas-pipeline builders settled down on the Lomnitsa's shores several months ago. In the rayon of Bogorodchany they established a housing settlement and built a welding yard, and the unique support system for the Bogorodchany-Solotvino segment of the gas pipeline began to supply the construction project with semifinished items.

The local semifabricates are two pipes joined by a weld, or, simply, pipe sections. Some sections are straight, and some are curved. They are bent here on a special installation. For indeed the gas pipeline is not a straight strand: if you look at it from a helicopter, an enormous steel "snake" that climbs the rocks is seen.

At the yard, everything was going on routinely when lightning rent the sky and dense streams of rain struck the roofs. In an instant the river swelled and burst from its banks. The elements did not die down for a whole week. The construction project in the mountains, it seemed, should have choked. A bridge was destroyed, an embankment was washed away. How to deliver the double joints to the route from an islet?

"Indeed, they were not delivered," says Kh. Gireyev, assembly-section supervisor. "But the people in the mountains continued to lay pipe. A reserve that we had created the day before supplied the project."

Gireyev is a specialist who knows his business well. He built an oil refinery here. He liked the district and the people, and when the facility went into operation he remained at the enterprise as an operator. He devoted 15 years to his new trade. But on finding out about the erection of the gas pipeline, he decided to return to his former occupation. Put in charge of an assembling section, Gireyev at once focused his collective's efforts on creating a reserve of double joints. In the Carpathians it is impossible to work, as they say, directly off arriving transport.



Probably it is easy to say. The pipes first are brought together, and then they are tack-welded from the top and from inside. Then the seam is made, the joint is X-rayed so that--god forbid--a defect does not leave the "stocks." A welded section weighs up to 18 tons. Try to control such a cumbersome object.

And imagine, people handle them as if they were toys. Obviously, with the help of machinery. Thus, a crane lifts two enormous cylinders at once and gently lays them on the rollers of the conveyor. Oh! yes, a real welding line operates at the yard. After a few minutes of manipulation, and as much time again for centering, N. Levochko disappears into the pipe, taking with him a power cable. In the cylinder's belly a blue flame flares up--the worker begins to sew the cylinders together with an electrode needle. The electrode in his hands quickly melts away. He gets another, a third....Nearby, A. Arkusha connects up the same strand. The welders on the line are of the 5th and 6th skill categories. With a norm of 25, they present to the reliability laboratory 30 double joints per day for checking.

But production at the base is, for the pipeline layers, a bird in the sky. The double joints should be ready not only in time for the tunnelers but ahead of time for them. Here everything depends upon the drivers. Therefore, from the first days, the base's collective competed under the slogan, "Above-plan output means above-plan runs."

It was easier to keep one's word when the pipeline layers were close to the welding site. But now they are 55 kilometers away. Plus the difficulty of the road: swamps, hairpin-turns and passes. But nevertheless, drivers V. Rubik, V. Abramyan and M. Vagilevich manage to make even three trips instead of two.

Here is the yard where one of the collectives of the Transcaucasus Pipeline Construction Administration under senior superintendent A. Ter-Sarkisov is working. The superintendent is not accustomed to the difficulties. Here in Carpathia, he built the Bratstvo and Soyuz pipelines. The Urengoy-Uzhgorod line is a harder nut. The best routes have already been used. The new strand is to be laid down in the most difficult places. A kilometer-long aerial crossing is to be made over the same Lomnitsa, and another over the Bystritsa. The river beds must be changed and concrete piles driven into the rock. And a 90-meter multiple-joint has to be stretched out in a tunnel under a railroad!

The pipelayers are hard on the heels of the ditch diggers. In L. Timus's brigade there are 23 welders, who tend 5 mobile units. Each one's task is a joint and a half. Many are managing to weld two. Therefore, there is always a front for the equipment operators' work. They do not leave the yard, when the strand has not been readied for lowering into the ditch. Ye. Rakitin and P. Kalitka always lower the pipe into the ditch bottom in such a way that no kind of additional work is required after the operation has been performed.

Give speed and quality! Everything on the Carpathian section of the route is subordinated to this. And there is speed and quality. In 3 months, 2,111 multiple-joint pipe sections were welded, and 40 kilometers of pipe are already in the ground. The collective of the Transcaucasus Gas Pipeline Construction Administration has undertaken a commitment to reach the 60th kilometer on the route by the 60th anniversary of the forming of the USSR.

And lying ahead there is still a 172-kilometer segment of the path to the border, over which another integrated flow-line group, under M. Gambar'yan, is moving. The operators plan to get the better of the route by the end of 1983--far ahead of the deadline.

## PIPELINE CONSTRUCTION

### VIGNETTES OF URENGOY-UZHGOROD PIPELINE CONSTRUCTION LIFE OFFERED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Oct 82 p 1

[Article by V. Starostin (Lipetskaya Oblast): "According to the Solar Clock"]

[Text] Urengoy-Uzhgorod: the people and the route.

The rotating duty-settlement runs, so to speak, by the solar clock. We get up at dawn, when there's hardly any light. The sun peeps out and everyone is contented: every fine day is to the advantage of the line workers. And at this time it was an excellent fall morning. I stand with Ivan Alekseyevich Astashov, leader of a welders' brigade of the second operating flow-line group on the 2,880-kilometer gas pipeline. He had a few more minutes to spare before this whole steel armada--pipe-layers, bulldozers, welding units--was to move out, almost a kilometer closer to Urengoy. Ivan Alekseyevich has been working for 20 years in one administration of Soyuzgazspetsstroy [All-Union Trust for the Construction of Special Gas-Industry Enterprises] and he remembers tens of the most difficult routes and the most varied parts of the country.

This segment is no comparison with the one they had in Vologodskaya Oblast on the Urengoy-Gryazovets gas pipeline. They extended the strand kilometer after kilometer over innumerable swamps, and the overhead welders welded joints while standing almost waist deep in water. And the powerful pipe carriers got stuck on the log roads, unable to move the multiple-joints. Nor was it at all like either the Bukhara-Ural segment, where, from morning on, the sun--their main enemy--shone mercilessly, and they did the backing run sitting inside the scorching pipe, like in a sauna....Here there is a special soul-aching beauty in the blue clover field that is cut through to the very horizon by the gas pipeline's yellow ditch.

"It's some sort of a pity," Ivan Alekseyevich kept repeating. "You just lower the pipe--your hands itch to sit behind the levers yourself--and to level everything with precision....Well, that's all right, now we are laying the strand, we shall do the recultivation, and the field will be like it was before."

As the first business, he stuck a pair of specially highly visible markers on the other side of the road--a distinctive boundary which pipelayer and bulldozer operators were categorically prohibited from violating. However, there has not been any occasion yet for any of the equipment operators to press their crawler tracks on the extra land as they go along. A firm, unspoken bond operated here: the land and the people.

...You perceive the rhythm of the integrated operating flow-line group best of all here, in the welders' brigade. Each hour they bring the strand of gas pipeline farther and farther toward Urengoy.

But now the solar clock has stopped: from a small cloudlet rain comes in a spray, and the welders, swearing, take cover in the bus.

"That's the way life is," Anatoliy Georgiyevich Kalmykov philosophizes. "Suddenly, quite unexpectedly, a cloud comes up, there is a clap of thunder, and you tell yourself, enough of this knocking about on assignments, other people are living peacefully, without nervous strain."

And he began to recall how, many years ago, at one of the difficult sections of the Urengoy-Gryazovets gas pipeline, there had been "a clap of thunder" in his work record: for 1½ shifts of the rotary-welding section where he then worked, he had rushed out defective multiple joints, until distraught members of the field testing laboratory came running. All the joints, one after another, and this was seen clearly on the film, showed poor fusion and slag pores. Corrective reproofs badly hurt his self-esteem, and he decided to leave the line.

Viktor Vasil'yevich Pichurin, who had been his first teacher and unquestionably an authority in welding matters, did not try to dissuade Kalmykov. "This is what I will tell you, Tolya: good welders are needed everywhere, you will not vanish. The line, brother, it will draw you...." And he recalled his words often, when everything apparently had already been fitted into place. An apartment in Voronezhskaya Oblast, interesting work, sufficiency for the family, the children growing up....But the old teacher was right--the route called him. His wife noted the change and said: "Don't torture yourself. Go on, go back if you cannot do otherwise."

They returned to the route 1½ years ago, to their section, and again they proved to be able to weld the most important seams--filler seams and facing seams. "You still have not forgotten?" the welders teased. He was not offended--everything here was the same as usual, even those endless jokes were dear. The brigade leader said of him: "The route is held together by people like him."

...The solar clock showed early evening when the brigade returned to the settlement. Valentina Davydovna Astashova loved this time best of all: gathered around the table were the whole family--the father, the oldest son--Viktor--and his fiancée, his daughter Tanya (she is now a student at a Moscow institute), and the youngest of the pipeline route workers, the common favorite, the 16-year old Aleshka. True, she did not like the fact that the men's conversations often ended in disputes, but just try to dissuade them.

"You slowed down somewhat today at the crossings," the young Viktor, brigade leader of the "overhead welders" usually starts off. "But we, Dad, were in complete order."

"Ha!" twitted the father. "I was just gathering speed...."

Word after word--and already now there is a full production conference--who is ahead, whose brigade is lagging, who is boasting. And then the conversation

necessarily returns to the older one: what is Viktor to do? He must finish the institute, but he wants no part of it: what good is a diploma, he says.

"Wait," says the older Astashov, "let's ask Mother, let's discuss it: does it turn out that a person studies in vain?"

A problem of the construction project is the great gap in the pay levels of engineers and workers--it was as if this topic had been specially programed for the Astashov family, to give sustenance to such family conversations. But the problem, all the same, was severe. The young Astashov was studying in the correspondence division of a technological institute. And it turns out that if he goes up now for a promotion, he will become, let's say, a foreman or superintendent, and his pay will be cut, as a minimum, in half.

"It turns out wrong," sighs Valentina Davydovna, "an engineer has worries, I know myself, more than enough of them, and the pay is small. People chuckle: if you work poorly then we will send you to the engineers. Something here, I think, is not right."

This simple worldly conclusion of Valentina Davydovna--"something here is not right"--is concurred in also by the Ministry of Construction of Petroleum and Gas Industry Enterprises. The way out, at first glance, is simple: the pay of engineers and technicians who work in an operating flow-line group should be incorporated in a unified authorization order. But how is this to be done in practice? To increase everyone's pay without exception is false, and for the brigade it is unsuitable. To differentiate engineers and technicians with precision is complicated. "We have so many institutes," Valentine Davydovna argued in her own way, "and they cannot solve the problem. And so we argue about it evenings."

...And again it is early morning by the solar clock. The day promises to be fine--and everyone is satisfied. Only Anatoliy Kalmykov has a chagrined face--they did not take him on the route. There still remained a couple of days before departure and, moreover, the trust's summer track meet had been held. The excellent volleyball player was to protect the sports honor of the flow-line group. The lads from his brigade, of course, took Anatoliy at once into the rotation:

"Listen, Tol, it is better not to return without the cup. As it is, a prize has been set for you...as champion in height among the welders."

"I'm serious, Ivan Alekseyevich," Kalmykov implored. "And how is the pipe?"

"What about the pipe?" said the brigade leader. "The pipe is in order."

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## PIPELINE CONSTRUCTION

UDC 532:529

### WAY TO ASSESS PRESSURE LOSSES IN OFFSHORE PIPELINES FOR GAS-LIQUID MIXES TOLD

Baku AZERBAYDZHANSKOYE NEFTYANOY KHOZYAYSTVO in Russian No 8, Aug 82 pp 39-43

[Article by F. A. Mamedov, A. R. Melikyan and V. A. Saakyan (Gipromorneftegaz [State Institute for the Design of Offshore Oil and Gas Enterprises]): "Assessment of Pressure Losses in Underwater Pipelines That Transport Gas and Liquid Mixtures"]

[Text] In the initial period of development of offshore oilfields, a system of single-pipe transport from the various offshore platforms had a number of advantages over any system of separate transport of crude and gas. The rapid introduction into operation of wells at which drilling has been completed becomes possible, the operating technology is simplified to the maximum, scarce fixtures and equipment are saved, and the useful area at hydraulic-engineering structures is increased for purposes of long-range planning.

The transport of a gas and liquid mixture by underwater pipeline is characterized by a number of peculiarities. While on dry land it is possible to modify a route's terrain (cuts and fills), to observe standards for slopes, and to install traps where condensate is likely to accumulate, this potential is absent at sea.

As sea depth and the distance from offshore structures to the shore increase, underwater oil and gas collecting mains begin to operate under more severe conditions. Transport of the gas and liquid mixtures is complicated by a reduction in the temperature of the mixtures to the ambient temperature, the presence of a constant adverse gradient, and the nature of the seabed (the amplitude of change in the dips and rises of the pipeline). Where the underwater pipeline emerges at neighboring platforms, the gas rushes in through the column of liquid, causing pressure pulsations.

Practice in designing underwater pipelines for transporting gas and liquid mixtures indicates that the computed parameters of pipelines differ from their operational characteristics. Analysis of the operation of the oil and gas collection mains that have been designed reveals errors that reach 30-40 percent.

In computing pipeline operating regimes, the amount of gas that remains dissolved in the crude must be known. In the case of the transporting of a crude oil-water-gas system, we assume zero solubility of the gas in the brine.

The amount of free gas in a pipeline is determined in accordance with the formula

$$Q_{\text{free gas}} = (J - \phi) Q_{\text{crude oil}}, \quad (1)$$

where  $J$  is the full gas factor in  $\text{m}^3/\text{m}^3$ ; and  $\phi$  is the residual gas factor of the crude at pumping pressure and temperature, in  $\text{m}^3/\text{m}^3$ .

Henry's law for multiple-component mixtures is often used in determining the residual gas factor. As pressure rises within the system, greater deviations from this law are noted [3]. Mathematical processing of experimental data yields more precise results where the gas factor has been determined as a function of pressure and temperature (figure 1).

Figure 1.

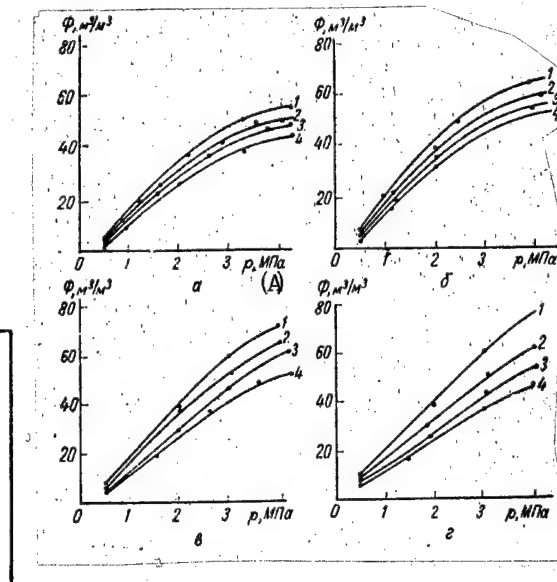
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For  $a$ ,  $\delta$ ,  $\theta$ , and  $\varphi$ , respectively,  
 $t = 5, 10, 15$  and  $20$  degrees C.

For 1, 2, 3 and 4, respectively,  
 $\rho = 800, 850, 900$  and  $950 \text{ kg/m}^3$ .

A.  $p$ , MPa.

Precise establishment of the mixture's average viscosity enables true line losses of pressure in the pipeline to be determined. It has been established experimentally that the viscosity of degasified crude depends but little upon pressure. The oil's viscosity as a function of the gas factor and pumping temperature takes the form [1]:



$$\mu = \mu_t e^{-a\phi}, \quad (2)$$

where  $\phi$  is the amount of gas soluble in the crude, in  $\text{m}^3/\text{m}^3$ ;  $a$  is a coefficient which is a function of temperature (figure 2); and  $\mu_t$  is the viscosity of the degasified crude at the pumping temperature.

Tables 1 and 2 show the initial data for well No 4 of the 28 Aprelya field.

Figure 2.

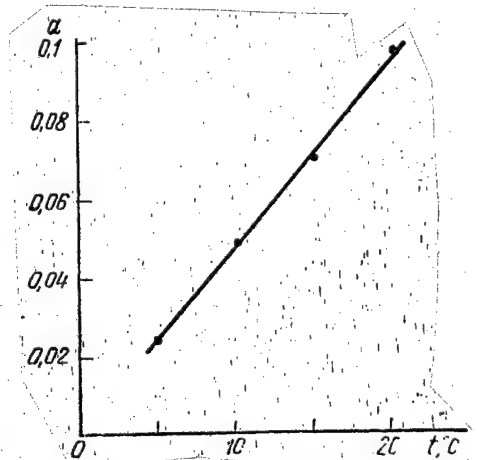


Table 1

Formation being operated.....	X horizon of the Balakhanskaya suite
Density of the crude.....	864 kg/m <sup>3</sup>
Viscosity, dynamic.....	3.4 mPa·sec
Flow rate of the liquid.....	264.1 m <sup>3</sup> /day
Gas factor.....	155 m <sup>3</sup> /m <sup>3</sup>
Content:	
Water.....	40 percent
Mechanical impurities.....	0.20 percent
Total identifiable asphalts and tars..	20.0 percent
Paraffin.....	-

Table 2

Formation being operated.....	X horizon of the Balakhanskaya suite
Pressure.....	10 MPa
Gas density at atmospheric pressure.....	600 kg/m <sup>3</sup>
Compressibility factor.....	0.92
Flow rate of the gas.....	35,261 m <sup>3</sup> /day
Composition of the gas:	
CH <sub>4</sub> .....	96.44
C <sub>2</sub> H <sub>6</sub> .....	0.55
C <sub>3</sub> H <sub>8</sub> .....	0.49
n = C <sub>4</sub> H <sub>10</sub> .....	0.02
i = C <sub>4</sub> H <sub>10</sub> .....	0.08
CO <sub>2</sub> .....	2.32

The gas and liquid mixture is transported by a pipeline 11,750 meters long, 0.325 meter in diameter and 0.016 meter in wall thickness.

In the receiving oil and gas collector main,  $p_2 = 0.6$  and  $p_{\text{average}} = 0.86$  MPa.

The crude and gas mix that is being transported has an ambient temperature of 16 to 5 degrees C. The viscosity of the crude and gas is shown in table 3.

Table 3

Mixture component	Density kg/m <sup>3</sup>	Viscosity	
		mPa·sec	m <sup>2</sup> /sec
Crude oil	864.0	2.5	$2.89 \cdot 10^{-6}$
Gas.....	0.770	$1.07 \cdot 10^{-2}$	$1.39 \cdot 10^{-5}$

Note: T = 278 K.

Solution of the problem of the parameters of flow of the gas and liquid mixture is reduced to three basic steps:

determination of the amount of free gas being transported during pumping, and derivation of the average values for the amounts that take part in the calculation;

analysis of the profile of the underwater pipeline, determination of the flow regime for the gas and liquid mixture, and selection of a method for the design; and



determination of losses in overcoming line resistance and losses of pressure to local resistance.

A design scheme for a pipeline is shown in figure 3. We define:

1. The amount of free gas being pumped is

$$Q_{\text{gas}} = Q_{\text{crude}} (1 - \phi) \frac{p_0 T_{\text{av}}^z}{p_{\text{av}} T_0},$$

where  $Q_{\text{crude}}$  is the amount of crude being pumped per day, in m<sup>3</sup>/day.

2. Input-output gas saturation is, by volume

$$\beta = \frac{Q_{\text{gas}}}{Q_{\text{gas}} + Q_{\text{crude}}}.$$

3. The velocity (m/sec) of the gas and liquid mixture is

$$v_{\text{mix}} = \frac{Q_{\text{gas}} + Q_{\text{crude}}}{0.7854D^2},$$

where D is the pipe's internal diameter, in meters.

4. The Froude's number of the gas and liquid mixture is

$$Fr_{\text{mix}} = \frac{v_{\text{mix}}^2}{gD}.$$

5. The true gas content of the stream in the linear portion of the pipeline is

$$\phi = 0.81\beta(1 - e^{-2.2\sqrt{Fr_{\text{mix}}}}).$$

6. The density of the liquid, taking into account the gas dissolved in it and the mixture in the linear portion of the pipeline:

$$\rho_{\text{liq}} = \rho_0 e^{-b\phi}; \text{ and } \rho_{\text{mix}} = \rho_{\text{liq}}(1 - \phi) + \rho_{\text{gas}} p_{\text{av}} \phi$$

where b is a coefficient determined in accordance with figure 4.

7. The viscosity of the gas and liquid mixture is:

$$\frac{1}{\nu_{\text{mix}}} = \frac{\beta}{\nu_{\text{gas}}} + \frac{1 - \beta}{\nu_{\text{liq}}}.$$

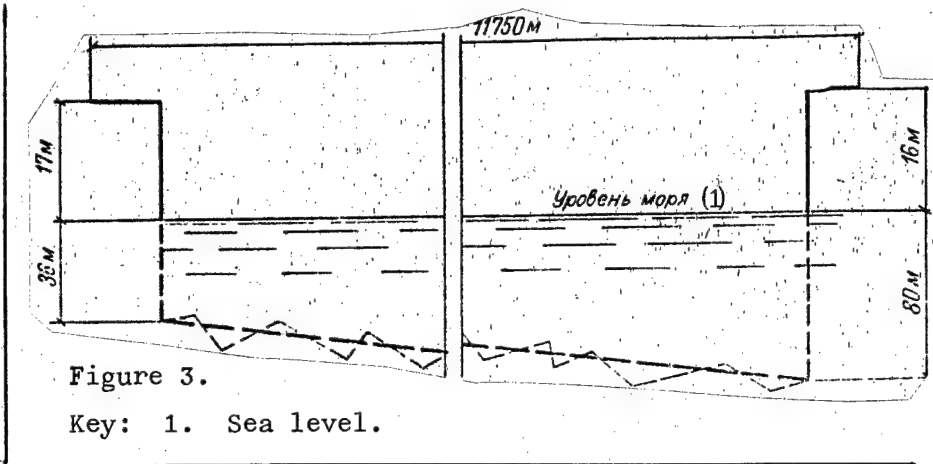


Figure 4.

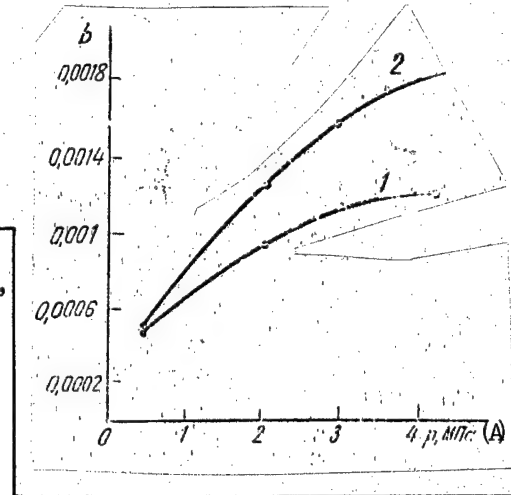
Key:

For 1 and 2,  $\rho = 800$  and  $900 \text{ kg/m}^3$ .

A.  $p$ , MPa.

The value  $\nu$  has been adjusted for conditions during the transporting of the gas and liquid mixture, in accordance with formula (2).

The coefficients  $a$  and  $b$  were obtained by statistical processing of data about the operation of the oil and gas collection mains [4].



8. The Reynolds' criterion for the mixture is:

$$Re_{mix} = \frac{d_{r_{mix}}}{\nu_{mix}}.$$

9. The coefficient of hydraulic resistance of the gas and liquid flow is:

$$\lambda_{mix} = \frac{1}{(1.8 \lg Re_{mix} - 1.5)^2}.$$

10. The pipeline's pressure drop is:

$$\Delta p = \Delta p_{fric} = \Delta p_h.$$

11. Losses of pressure to friction [1]:

$$\Delta p_{fric} = \beta g \frac{L \mu_{mix}^m Q_{mix}^{2-m}}{\rho_{mix}^{m-1} D^{5-m}},$$

where  $\beta$  is  $\frac{8\lambda}{\pi g}$ ;  $g$  is the acceleration of free fall,  $\text{m/sec}^2$ ;  $L$  is pipeline length in meters;  $\mu_{mix}$  is the dynamic viscosity, in  $\text{mPa}\cdot\text{sec}$ ;  $Q_{mix}$  is the volumetric flow rate of the mixture, in  $\text{m}^3/\text{sec}$ ;  $D$  is pipeline diameter, in meters; and  $\rho_{mix}$  is the mixture's density, in  $\text{kg/m}^3$ .

12. Losses of pressure in overcoming unevenness of the relief are:

$$\Delta p_h = \sum_{i=1}^n h \rho_{asc} g = \sum_{i=1}^n h \rho_{desc} g;$$

$$\rho_{asc} = \rho_{liq}(1 - \phi_{asc}) + \rho_{gas} \phi_{av} \phi_{desc}; \text{ and}$$

$$\rho_{desc} = \rho_{liq}(1 - \phi_{desc}) + \rho_{gas} \phi_{av} \phi_{desc},$$

where  $h$  is the height of the riser, in meters;  $\rho_{asc}$  and  $\rho_{desc}$  are the densities of the mixtures of the ascending and descending flows, in  $\text{kg/m}^3$ ; and  $\phi_{asc}$  and  $\phi_{desc}$  are the true gas content of the ascending (a) and descending (d) flows, which were determined in accordance with figure 5.

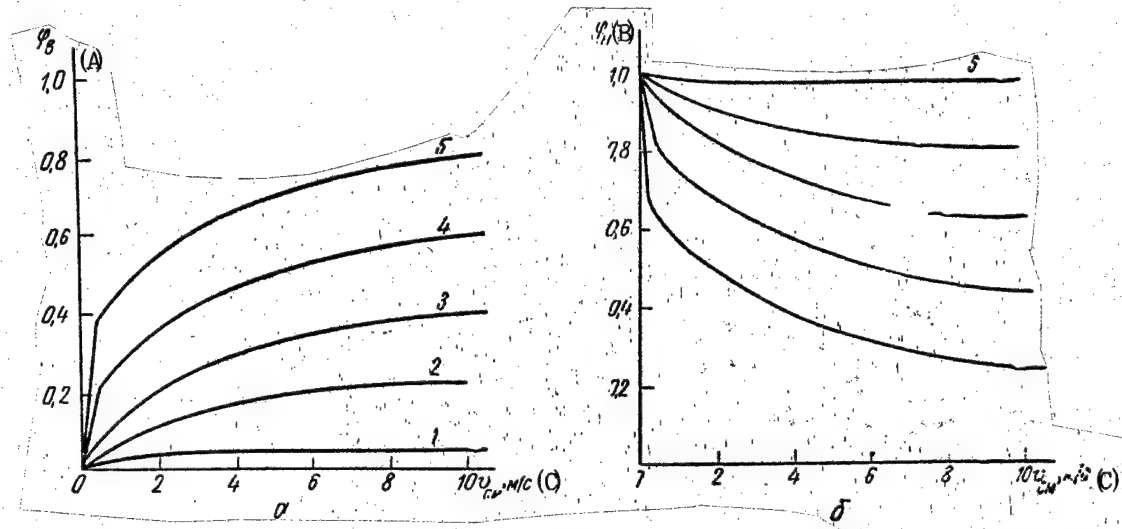


Figure 5. For 1, 2, 3, 4 and 5, respectively,  $\phi_g = 0.1, 0.3, 0.5, 0.7$  and  $0.9$ .

Key: A.  $\phi_{\text{ascending}}$  B.  $\phi_{\text{descending}}$  C.  $10v_{\text{mix}}$  m/sec.

13. The full pressure drop in the pipeline, taking the effects of all factors into account, is

$$\Delta p = K \Delta p_{\text{friction}} + \Delta p_h,$$

where  $K = 1.1$  is the coefficient that considers the effect of local resistance.

14. The initial pressure in the pipeline, which is determined by the indicated methodology, is

$$p_1 = p_2 + \Delta p \approx 1.4 \text{ MPa}.$$

### Conclusions

1. Having adopted the process of passing a gas-and-liquid mixture along pipeline Du300 isothermally, the optimal regime for pumping the mixture can be forecast with an adequate degree of precision.

2. In the winter, when the water temperature of the sea is  $t = 5$  degrees C, an increase in pressure in the pipeline of up to 1.4 MPa should be expected where  $Q_{\text{gas}} = 35,261 \text{ m}^3/\text{day}$  and  $Q_{\text{crude}} = 228 \text{ tons/day}$ .

3. The pipeline's throughput for crude oil  $Q_{\text{crude}} = 1,616 \text{ m}^3/\text{day}$ , for gas it is  $145,600 \text{ m}^3/\text{day}$ . In this case the initial pressure in the pipeline does not exceed  $p_1 = 4 \text{ MPa}$ .

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## GENERAL

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### WAYS TO INCREASE WEST SIBERIAN PIPELINE CONSTRUCTION EFFICIENCY TOLD

Moscow STROITEL 'STVO TRUBOPROVODOV in Russian No 9, Sep 82 pp 2-4

[Article by V. G. Chirskov, deputy USSR minister of Construction of Petroleum and Gas Industry Enterprises: "Ways to Raise Further the Efficiency of Construction in West Siberia"]

[Text] The 26th CPSU Congress called for intensive development of the country's fuel and power complex, primarily by accelerating oil and gas recovery in West Siberia. The branch that leads in creating fixed capital for the West Siberian oil and gas complex is the Ministry of Construction of Petroleum and Gas Industry Enterprises. The amount of work done annually in this region by Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] had grown 5-fold in 1982 in comparison with 1972--the year the ministry was created.

During the 10th Five-Year Plan the increase in construction-work volume for the complex as a whole was 73.8 percent, and, for the most important clients--Minnefteprom [Ministry of Petroleum Industry] and Mingazprom [Ministry of Gas Industry]--the figures were, respectively, 86.3 and 74.4 percent. The further development of integrated columns (operating flow-line groups) in West Siberian pipeline construction helped greatly in achieving this pace. Through introduction of the cost-accounting contract, the use of high-speed flow-line methods of welding, a concentration of resources, and a number of other factors, the season's output of the brigades that make up the operating flow-line groups rose 1.5-fold over 1975--it was an average of up to 100 km of pipeline for the season.

Engineering problems associated with the search for an effective method for securing pipelines to ditch bottoms in flooded localities were resolved. The successful use of fired and driven anchors that open up wide has enabled pipelaying here to be shortened, labor productivity to be raised, and consumption of the rolled metal and cement that are needed to manufacture the reinforced-concrete hold-down weights for securing pipelines by the traditional method to be reduced.

The "Sever" unit for resistance welding of pipe 1,420 mm in diameter, a resistance-welding machine for thick-walled small-diameter pipe that enables pipe-welding in an automatic mode, units for plasma cutting of pipe, cleaning and insulating combines, and marsh-going "Tyumen" vehicles were put into production. Conduit-free laying of utility and service lines found wide application. The outfitted-module method of construction was further developed.

The builders of oil and gas facilities in West Siberia are also solving massive and important problems during the 11th Five-Year Plan.

During 1981-1985 West Siberia should send to the country's economy as much oil and more than twice as much gas as it did during the whole preceding period since the start of the development of its fields.

The timely buildup in the oil and gas industries' planned capacity is to be a decisive factor in increasing oil and gas recovery during the 11th Five-Year Plan.

In order to support the established level of oil recovery, 26 new fields in the north must be built up and connected to existing trunk pipelines. It is planned to build about 1,000 km of high-pressure pipeline for gaslift operation. Introduction of the head 1,000-km section of the Kholmogory-Kuznetsk trunk oil pipeline must be provided for. Altogether during the five-year plan, it will be necessary to transfer to oilfield workers 12,000 km of pipelines, or 4-fold as much as during the 10th Five-Year Plan.

Special importance is being attached during the 11th Five-Year Plan to developing the gas-recovery complex. A rapid increase in the recovery of Siberian gas was advanced by the 26th CPSU as a task of paramount economic and political importance.

West Siberia must also increase during the five-year plan capacity for the recovery and transport of at least 250 billion m<sup>3</sup> of gas. Five huge West Siberia-Central Economic Region gas pipelines and the Urengoy-Uzhgorod export gas pipeline, 1,420 mm in diameter, are to be built and put into operation. Total length of the northern sections of these gas pipelines is almost 11,000 km. More than 80 compressor stations must be built on these gas pipelines in West Siberia and put into operation.

In order to execute the planned program for the boosted development of West Siberia's gas industry, the ministry's construction organizations should, during the current five-year plan, do construction and installing work about equal in budget-estimated cost to that done during the preceding 15 years. The builders will erect for oil and gas field workers more than 5.3 million m<sup>2</sup> of housing, double the amount built during the 10th Five-Year Plan.

A sharp buildup of West Siberia's fuel and power capacity is impossible without introduction of the latest achievements of scientific and technical progress and improvement of the economic mechanism.

The main direction of a unified engineering policy for further development of the oil and gas industry complex is intensification of the production process at all of its stages: design, construction, recovery, transport and refining. In the area of design, this means a raising of pipeline pressures, the use of more powerful gas and crude-oil transfer-pumping units, the cooling of gas being transported, a reduction in the "interval" of compressor and pump stations, and so on.

The use of new equipment of high unit capacity, particularly gas-turbine units of progressive design with capacity of up to 25,000 kW, as well as units with ship and aviation drives of 10,000 and 16,000 kW capacity, guarantees a 1.5-fold to 2-fold shortening of construction time for compressor stations and it reduces labor expenditures greatly.

In order to develop West Siberia's oil and gas fields as quickly as possible, systematic implementation of the set of measures for reequipping the industry that the party and the government have planned is of exceptionally great importance. The power-to-labor ratio in construction organizations will be approximately doubled by the end of the five-year plan through the delivery of construction and transport machinery of increased unit capacity, in northern versions, and with high off-the-road capability.

Surface structures will be built preferentially by the outfitted-module method, which will enable the time spent erecting them to be reduced and the quality and effectiveness of construction work to be raised. For these purposes, the capacity of box-module manufacturing enterprises in West Siberia is to be brought up to 200 million rubles' worth per year by 1985.

The fulfillment of 11th Five-Year Plan tasks requires further improvement in the management of oil and gas construction in West Siberia.

The construction management structure in West Siberia now differs considerably from what it was years ago.

The basis of the new structure, which, as experience indicates, corresponds to modern requirements, is the integrated specialized main administration, and, within the main administration, integrated construction and installing trusts. The very first task of main-administration and trust supervisors is the most rapid fine-tuning of all working elements of the organizations being created. This relates especially to Glavurengoygazstroy [Main Administration for the Construction of Gas Industry Facilities at Urengoy], Sibkomplektmontazh and Glavsibtruboprovodstroy [Main Administration for Pipeline Construction in Siberia].

An important area for increasing oil and gas construction effectiveness in West Siberia is improvement of its economic mechanism, which is operating under difficult natural and climatic conditions, in a poorly developed region with a complicated transport scheme. These peculiarities require a special approach here for improvement of the economic mechanism.

Conversion to the system of planning and evaluating organizational activity in accordance with construction commodity output must be completed to the full extent.

Improvement of the planning system and raising the level of planning work are among the main elements for improving the economic mechanism and are important factors in helping to accelerate the construction of facilities and growth in capital investment effectiveness.

Many years of experience indicate that the conversion to two-year continuous planning for introducing capacity into operation and turning construction commodity output over to clients will play a decisive role under West Siberian conditions in improving the system for planning, financing and organizing the management of oil and gas industry construction work. In so doing, of exceptional importance is the conversion to two-year planning for the erection of pipelines, since orders for pipe are made two years prior to the start of construction.

The two-year plan provides for reliability of planning and preserves the continuity thereof, supplementing five-year and annual plans. Drafts of two-year plans for



introducing facilities into operation are developed by clients and contracting organizations each year, simultaneously with drafts of the annual plans.

Consolidated drafts of two-year plans include all the capacity and facilities for production and nonproduction purposes that are included or are not included in the listings of the annual plan for developing the USSR's national economy, the construction and introduction into operation of which are called for during the two years being planned. In so doing, two-year plans for introducing into operation pipelines that are included in the listings of the annual plan for developing the USSR's national economy are developed and approved in the procedure established for such construction projects and facilities throughout the whole national economy. Drafts of two-year plans for introducing into operation jobs that are not included in the indicated listing are examined by Minneftegazstroy, jointly with Minnefteprom and Mingazprom, and they adopt coordinated decisions for them. These plans for the main administrations are approved by Minneftegazstroy.

Enterprises and client organizations present to their superior organizations, simultaneously with drafts for two-year plans, their proposals for deadlines for delivering operating equipment and outfitting equipment for construction projects and facilities. The amounts of construction commodity output for construction projects and jobs and the amounts and deadlines for the delivery of operating and outfitting equipment for the second year of the two-year plan are refined by the clients and contracting organizations when they develop drafts of plans and indicators for lists of construction project titles for the next plan year. USSR Gosplan and the clients coordinate on two-year planning under West Siberian conditions. But in order to realize such planning, concrete decisions and persistence in implementing them are required of supervisors of all ranks.

A large amount of work must be done in connection with the conversion on 1 January 1984 to the new budget-estimating norms and prices for construction. Siberian organizations are now preparing the initial data.

Drafts of new norms for overhead expenses for construction, which should reflect in the budget estimates the socially necessary level of expenditures for the organization and management of construction, must be developed this year. In order to determine the level of overhead expenditures, the standard provisional net output is computed as applicable to regions and types of construction.

Further development of the brigade form of organizing the work has an important role in raising the economic effectiveness of construction work. In accordance with the special-purpose program for introducing and improving brigade cost accounting that was worked out and approved by Minneftegazstroy for 1981-1985, the proportion of workers covered by this way of organizing construction work in total worker manning should increase during the five years for Tyumen main administrations and associations by an average of 8 percent, reaching 79 percent by 1985. Cost accounting brigades will be accomplishing about 65 percent of all contracting work in West Siberia by the end of the five-year plan, and savings in the estimated cost for doing the work should exceed 70 million rubles during the five-year plan.

A number of other problems connected with improving management's organizational structure and planning--from the brigade to the ministry--and with intensifying the role of economic levers and incentives in the management of oil and gas construction also are to be solved during the 11th Five-Year Plan. During the 1980's,

economic-type activity of enterprises and organizations should be developed intensively.

The collectives of Siberia's builders have got a good start since the first days of the 11th Five-Year Plan. By the day of the opening of the 26th CPSU Congress, four months earlier than planned, Glavsibtruboprovodstroy had completed the construction of a 525-km section of the Urengoy-Gryazovets gas pipeline. The first gas pipeline from the Urengoy field--the Urengoy-Gryazovets-Moscow line--was turned over for operation ahead of time. For the first time in pipeline practice, a trunk line was introduced at design capacity during the year construction was completed.

During 1981 the plan for construction and installing work volume was overfulfilled by 187 million rubles' worth, and, in so doing, the pace of growth was 17.9 percent. Commodity output with a budget-estimated cost of 1.8 billion rubles was turned over to the clients. Introduced into operation were 2,488 km of trunk line and 1,550 km of intrafield pipelines (double the 1980 figure), 12 compressor stations, 6 crude-oil transfer-pumping stations, and a number of other items of production capacity. Housing with a total area of 922,000 m<sup>2</sup> and facilities for social and cultural purposes were turned over for operation.

In Siberia this year 3,100 km of trunk pipelines, 2,000 km of intrafield pipelines, 16 compressor stations, installations for the integrated treatment of 60 billion m<sup>3</sup> of gas, and installations for treating 35 million tons of crude, tanks that hold 600,000 m<sup>3</sup> of crude, 1,003,000 m<sup>2</sup> of housing and a number of other facilities are to be introduced into operation. It is planned to turn over to clients construction commodity output in the amount of 2.4 billion rubles and to do 2.2 billion rubles' worth of construction and installing operations.

In the first quarter of 1982 the linear portion of the Urengoy-Petrovsk gas pipeline and its Novyy-Kazym'skaya Compressor Station were completed and turned over for operation ahead of time.

During the first half of 1982 Siberia's builders did 1,212 billion rubles' worth of construction and installing work, which is 54 percent of the annual plan, a growth of 13.6 percent over the corresponding period of the preceding year. The introduction of all production capacity planned for the Ministry of Oil Industry has been provided for.

At the same time, a lag in introducing some jobs into operation was permitted during the first half of the year. Thus, Glavurengoygazstroy [Main Administration for the Construction of Gas Industry Facilities at Urengoy] did not turn over for operation UKPG-7 [Integrated Gas-Treatment Installation No 7] at the Urengoy field and the Urengoy'skaya and Pangody Compressor Stations; Glavsibtruboprovodstroy failed to turn over the Long-Yugan, Sorum, Peregrebnaya and Yzyum-Yugan Compressor Stations; and Glavtyumenneftegazstroy [Main Administration for the Construction of Oil and Gas Enterprises in Tyumenskaya Oblast] did not turn over the Priob'skaya KS [Compressor Station]; and Glavurengoygazstroy, Glavtyumenneftegazstroy and Glavsibtruboprovodstroy did not insure fulfillment of the plan for introducing housing.

Siberian subunits have all the potential for successful completion of the plan for introducing capacity during the second year of the five-year plan. It is necessary to intensify the organization of construction work and insure more precision in supplying construction projects with the necessary materials and in the timely and delivery of completely outfitted equipment to the facilities being erected. It is

necessary to increase exactingness toward the quality of work, especially in housing construction, and the execution of the measures planned for accelerating the laying of the Urengoy-Uzhgorod gas pipeline must be stirred up.

Glavurengoygazstroy must, jointly with subcontracting organizations, resolve more actively the problems of building up the Urengoy field, introducing UKPG-8 and UKPG-9 into operation and connecting them up to the planned wells, and producing an adequate backlog of accomplished work in order to support the introduction into operation of UKPG-10 during the first quarter of 1983.

It is a matter of honor that the collectives of the Glav-sibtruboprovodstroy and Urengoytruboprovodstroy trusts build gas collectors for the Urengoy field ahead of time. Severtruboprovodstroy [Trust for Pipeline Construction in the Northern Economic Region] and Priob'truboprovodstroy [Trust for Pipeline Construction in the Ob Region] must insure introduction into operation of the head section of the Urengoy-Novopskov gas pipeline.

It is gratifying that Glavtyumenneftegazstroy, the most experienced collective of the branch, coped successfully with the task for the first half of the year. However, enormous efforts must be brought to bear to complete successfully the annual program for oil-industry facilities. These include gaslift compressor stations, installations for preparing crude, storage tanks and, the main thing, housing.

Having been included in the socialist competition for a worthy greeting to the 60th anniversary of the founding of the USSR, building organization collectives adopted increased commitments for 1982: to complete the plan for contract work by the 60th anniversary of the founding of the USSR, to reduce the operating costs of construction and installing work and to raise labor productivity in comparison with the established tasks, and to insure savings of material, fuel and power resources.

Minneftegazstroy and Mingazprom collectives have committed themselves to introduce the linear portion and the Novyy Kazym'skaya KS of the Urengoy-Novopskov gas pipeline by the 60th anniversary of the forming of the USSR--not in June 1983, as had been planned.

In order to carry out the strenuous program for oilfield construction, Glavtyumen-truboprovodstroy developed measures whose realization will enable at least 600 km of intrafield pipelines to be built in the summer of 1982. This will be a practical step toward fulfillment of the 26th CPSU Congress's instructions about developing and introducing the technology of year-round pipeline construction in regions that have difficult natural and climatic conditions and are difficult of access.

The 26th CPSU Congress set before Siberia's oil and gas recovery workers, construction workers and all participants in the investment process a complicated but realistic task for the accelerated development of the West Siberian oil and gas complex. This will require strenuous work and a purposeful and creative approach to the matter. Siberia's builders of oil and gas facilities are filled with resolve to carry out 11th Five-Year Plan tasks with honor.

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